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REPORT

OF THE

SUDAN MEDICAL SERVICE

FOR THE YEAR

1943

McCorquodale & Company (Sudan) Limited, Khartoum

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SUDAN MEDICAL SERVICE.

ANNUAL REPORT 1943.

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ANNUAL REPORT
OF THE SUDAN MEDICAL SERVICE
FOR THE YEAR 1943.

GENERAL HEALTH.

The state of public health remained satisfactory throughout the year despite the constant threat of the spread of epidemic disease from neighbouring countries. Ten separate infections of smallpox were introduced into the Sudan, eight from Egypt and two from Seoudi Arabia and four infections of typhus from Egypt. The spread of these diseases was checked by taking drastic preventive measures and the Sudan remained practically free from quarantine diseases.

Relapsing fever was prevalent along the pilgrim route from Darfur to Kassala and the incidence was particularly high in the irrigated area of the Gezira. Although the mortality from this disease is low where facilities for treatment are available, it causes much hard work among the long suffering public health staff to keep it in check. The incidence of malaria was comparatively low in the Northern Sudan owing to favourable climatic conditions. Diphtheria was more prevalent probably due to increased contact with the outside world under war conditions.

HEALTH OF OFFICIALS.

NATIONALITY.	Number of officials employed	Total		Average Days Sickness		Died	Invalided.
		Placed on sick list	No. of days sick	For all officials	For those who were sick		
British	756	288	2,287	3.03	7.94	3	1
Sudanese	3,853	1,293	13,987	3.63	10.82	5	21
Egyptian	405	111	1,031	2.55	9.29	2	5

The comparative figures for the last five years are as follows :—

	1939	1940	1941	1942	1943
British					
Days sickness	1.95	3.21	4.27	4.39	3.03
Died	1	3	4	6	3
Invalided	4	5	5	3	1
Sudanese					
Days sickness	1.88	1.95	1.37	3.06	3.63
Died	7	5	7	7	5
Invalided	13	20	10	23	21
Egyptian					
Days sickness	1.73	1.82	1.79	2.66	2.55
Died	5	3	2	2	2
Invalided	3	6	5	4	5

EPIDEMIC DISEASES.

CEREBROSPINAL MENINGITIS.

3,526 cases were reported with 765 deaths.

The distribution in 1943 by Provinces was as follows :—

PROVINCE.	Cases.	Deaths.
Blue Nile	112	34
Darfur	157	53
Equatoria	3069	625
Kassala	4	2
Khartoum	28	10
Kordofan	51	21
Northern	7	4
Upper Nile	98	16

The incidence during the last ten years has been as follows :—

YEAR.	Cases.	Deaths.	YEAR.	Cases.	Deaths.
1934	4,231	3,341	1939	2,714	647
1935	3,249	2,154	1940	4,032	796
1936	13,440	8,906	1941	1,824	459
1937	446	293	1942	2,787	1,027
1938	234	124	1943	3,526	765

DIPHTHERIA.

309 cases were reported with 45 deaths.

The distribution in 1943 by Provinces was as follows :—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Death
Blue Nile	51	6	Khartoum	135	17
Darfur	29	5	Kordofan	32	6
Equatoria	1	1	Northern	13	1
Kassala	47	9	Upper Nile	1	—

The incidence during last ten years has been as follows :—

YEAR.	Cases.	YEAR.	Cases.
1934	34	1939	77
1935	60	1940	114
1936	63	1941	186
1937	36	1942	207
1938	51	1943	309

The disease appears to be becoming more prevalent in the Sudan as contact with the outside world increases.

RELAPSING FEVER.

10,505 cases were reported with 668 deaths.

Cases were distributed among provinces in 1943 as follows :—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Death
Blue Nile	7,691	226	Khartoum	551	5
Darfur	807	312	Kordofan	902	89
Equatoria	86	4	Upper Nile	9	—
Kassala	454	32	Northern	5	—

The incidence during the last 10 years has been as follows :—

YEAR.	Cases.	Deaths.	YEAR.	Cases.	Deaths
1934	1	—	1939	1,006	92
1935	—	—	1940	1,487	45
1936	22	—	1941	3,028	110
1937	374	48	1942	5,287	559
1938	1,124	116	1943	10,505	668

The incidence of this disease has been steadily increasing in the irrigated area of the Gezira in recent years. There appears to be large numbers of carriers wandering about the country and there is a constant stream of West Africans passing through the area on pilgrimage, many of whom are infected. The local population is louse ridden. The difficulty of controlling the disease in this area is therefore very great. The problem was dealt with by extensive delousing of immigrants and infected areas, isolation of sick and contacts, and propaganda.

The assistance of the Sudanese local administrations was utilised to the fullest extent, as it was felt that the problem was largely a domestic one bound up with social conditions and cleanliness in villages and houses, and the village authorities are often the only persons who are in a position to report suspected cases early. The disease remained prevalent at the end of the year and it is fortunate that the mortality is so low provided medical facilities are made available at once for treatment of cases. Nevertheless the additional work thrown on the public health and medical staff of this area was very considerable. Many thousands of persons were deloused during the year.

SMALLPOX.

182 cases were reported with 36 deaths.

Cases were distributed among Provinces as follows :—

Blue Nile	1
Khartoum	1
Equatoria	12
Kassala	1
Kordofan	55
Northern	112

The incidence during the last 7 years has been as follows :—

YEAR.	Cases.	Deaths.
1937	425	57
1938	527	158
1939	553	103
1940	515	104
1941	46	—
1942	12	—
1943	182	36

753,125 vaccinations were carried out during the year. 4,459,483 vaccinations have been carried out in the Sudan during the last seven years.

The Sudan was exposed to risk of infection from Arabia, Egypt, Belgian Congo, French Equatorial Africa, Uganda and Kenya during the year, and the results of the extensive vaccination campaigns carried out in recent years were thoroughly tested as the infection was carried into the Sudan eight times during the year.

Although all pilgrims were vaccinated at Suakin it is impossible to ensure that all are effectively immunised before departure because most pilgrims wander across Africa and can only be seen for the first time when they arrive at Suakin shortly before departure.

The usual quarantine period at Suakin is not long enough to protect the Sudan from smallpox and the intention is that the population should be sufficiently vaccinated to avoid extensive outbreaks. This year, there was an outbreak near Shendi in the Northern Province traced to a pilgrim returning from Mecca. He had been partially immunised by vaccination and had such a mild attack that he did not report sick. On his recovery he killed a sheep and gave a large party to which a large number of his female relatives were invited. Unfortunately as is liable to happen in the Sudan many of them were unvaccinated, and contracted the disease. As soon as the outbreak was reported drastic measures were taken and it was stamped out at once. There were 84 cases with 10 deaths.

The original case attributed his own slight attack, compared with his unfortunate relatives' severe attacks not to his vaccination but to the fact that he had been on the pilgrimage and had received special divine protection.

Sporadic imported cases occurred in Suakin quarantine, and the Dongola District in Northern Province, also traced to the pilgrimage, and were easily dealt with.

Later in the year a few sporadic cases occurred in Wadi Halfa district caused by an imported case from Egypt. These were effectively dealt with and the whole area was revaccinated so that when another imported case occurred later in the year there were no secondary cases reported.

Camel-men returning from Egypt carried the disease to a remote area of northern Kordofan Province where the suspicious independent nomads had avoided vaccination in the past as far as possible.

The usual measures were taken and extensive vaccination at last carried out over the whole area and the disease was stamped out. There were 55 cases with 22 deaths. In December cases imported from Egypt were reported at Khartoum North and Musmar.

It appears that on the whole the Sudan is well immunised against smallpox and compares favourably with similar African countries in this respect, but that there are still gaps to be filled particularly among women in remote areas.

Every effort must be made to maintain and improve the present situation as regards vaccination.

It should be mentioned that the Sudan owes much to the remarkably effective calflymph produced by the Stack Medical Research Laboratories during the last seven years.

The number of vaccinations carried out during the last seven years has been as follows :—

YEAR.	
1937	561,197
1938	1,348,694
1939	580,052
1940	446,155
1941	302,084
1942	448,176
1943	753,125

TYPHUS.

9 cases of typhus were reported in Wadi Halfa district during June, July and August with 2 deaths.

All these cases were either cases imported from Egypt or direct contacts with imported cases.

By June typhus fever which had been epidemic in Egypt during the previous six months had spread to the Sudan frontier and an outbreak occurred in a village on the frontier. An imported case was then reported from a village near Wadi Halfa. Later six other cases were reported at Wadi Halfa of whom two were imported from Egypt and four were probably direct contacts with an imported case.

The most rigorous precautions were taken at once to prevent the disease from getting a hold in the Sudan. The frontier was closed to land traffic except along the river on approved routes and all persons entering the Sudan by any of these routes were deloused and kept under surveillance. Traffic on the river was prohibited between dusk and dawn and crews of all vessels entering the Sudan were deloused and kept under surveillance. All civil and military passengers travelling third class on the Egyptian Railways or third class on the Sudan Government Steamers were deloused on embarkation and kept under surveillance. All passengers on the intermediate steamer services were deloused and kept under surveillance. Intensive delousing was carried out at 20 day intervals of the whole population of the Wadi Halfa area numbering about 35,000. This population was particularly exposed to risk of infection owing to its close contacts with the Egyptian population across the border. This delousing campaign was found by careful tests to maintain this area more or less louse free over a period of many months. A minor difficulty which had to be overcome was the effective cleansing of the women's hair.

All these measures threw much work on the public health, medical, administrative railway and military staff in Wadi Halfa and it was due to their devotion to duty and continuous hard work that it was possible to prevent the disease from invading the Sudan.

The hospital and public health staff and others exposed to risk were inoculated against typhus and the wearing of anti-typhus clothes strictly enforced. A tribute should be paid to the work of the hospital orderlies staffing the quarantine hospital who were isolated with their patients and had to work in the heat of summer in anti- typhus clothing exposed to considerable personal risk. Fortunately only one, a female orderly, contracted typhus and she had been inoculated and had a very mild attack. If the disease had spread into the Sudan it might have had the gravest military and civil consequences as conditions were very favourable to its spread in many areas. For this reason the most rigorous precautionary measures were justified and were taken.

YELLOW FEVER.

No confirmed case was reported during the year.

ENDEMIC DISEASES.

ANCYLOSTOMIASIS.

The incidence and distribution of this disease show no change. It is only of importance in parts of Equatoria Province.

BILHARZIASIS.

BLUE NILE PROVINCE: Gezira Irrigated Area.

The comparative figures for annual surveys and routine examinations of the inhabitants of the Gezira for the past ten years are as follows :—

Schistosoma Haematobium.

Year.	ADULTS.			CHILDREN.			TOTAL.		
	No. Exmd.	No. Inftd.	%	No. Exmd.	No. Inftd.	%	No. Exmd.	No. Inftd.	%
1934	12,769	5	0.04	3,583	2	0.07	16,352	7	0.04
1935	13,902	8	0.06	2,945	12	0.40	16,847	20	0.12
1936	22,604	10	0.04	5,483	17	0.31	28,087	27	0.09
1937	30,768	26	0.08	10,038	63	0.62	40,806	89	0.22
1938	32,045	50	0.15	16,916	162	0.95	48,961	212	0.43
1939	17,044	30	0.17	10,877	174	1.50	27,921	204	0.73
1940	29,711	64	0.21	12,310	109	0.87	42,021	173	0.41
1941 ...	19,588	17	0.09	14,243	37	0.20	33,831	54	0.16
1942	24,888	90	0.30	10,460	115	1.08	35,348	205	0.50
1943	32,320	321	0.99	11,929	143	1.19	44,249	464	1.05

The increased incidence is disquietening and is being investigated.

White Nile Reservoir—Bilharzia Mansoni.

The figures for the White Nile Reservoir were as follows :—

District	Bilharzia haematobium		Bilharzia mansoni.	
	No. Exmd.	No. Inftd.	No. Exmd.	No. Inftd.
Dueim	1,016	191	489	37
Kosti	3,626	430	1,005	71

NORTHERN PROVINCE : Dongola and Merowe Districts : Bilharzia Haematobium.

The comparative figures for the last ten years are as follows :—

Year.	Number examined	Infections found.	Percentage	Year.	Number examined	Infections found.	Percentage
1934	46,054	1,768	3.8	1939	40,194	1,054	2.6
1935	40,950	1,408	3.4	1940	35,205	1,107	3.1
1936	37,334	1,268	3.4	1941	28,982	838	2.9
1937	46,741	1,155	2.5	1942	30,698	1,275	4.1
1938 ...	44,517	891	2.0	1943	17,445	613	3.5

Halfa : Wadi Halfa District : Bilharzia Haematobium.

The results of surveys for the last ten years are as follows :

Year.	Number examined.	Infections found.	Percentage	Year.	Number examined.	Infections found.	Percentage
1934 ...	20,180	3,927	19.46	1939	18,319	2,422	13.1
1935	12,076	2,613	21.6	1940	16,064	2,435	15.1
1936	12,437	1,439	12.9	1941 ...	13,590	2,039	15.0
1937	18,498	2,002	10.8	1942	13,453	1,785	13.3
1938 ...	21,958	2,763	12.5	1943	7,201	1,261	17.5

BLACKWATER FEVER.

The incidence of this disease during the last ten years has been as follows :—

Year	Cases	Deaths	Year	Cases	Deaths
1934	34	9	1939	20	7
1935	18	9	1940	24	9
1936	38	14	1941	28	9
1937	20	5	1942	29	11
1938	29	8	1943	17	3

The nationalities affected were :—

	Cases
Sudanese (Arab)	9
Sudanese (Negroid)	3
Abyssinians	—
Greek	—
European	5

The following table shows the incidence by age and sex in the various areas:—

Province and District.	Male		Female		Age Groups in Years.					
	Cases	Deaths	Cases	Deaths	5–15	15-25	25-35	35-45	45-65	Age Unknown
Blue Nile	3	—	—	—	—	—	1	1	—	1
Equatoria— ...	9	3	2	—	1	—	5	3	2	—
Kordofan	3	—	—	—	—	—	—	2	1	—
Total	15	3	2	—	1	—	6	6	3	1

DRACONTIASIS.

There is no change to report in the incidence of this disease. It remains prevalent in parts of the Southern Sudan.

DYSENTERY.

2,786 cases were admitted to hospital of whom 2,354 were diagnosed as Amoebic and 432 as Bocillary. Amoebic dysentery is overdiagnosed and steps are being taken to correct this.

The following table shows the admission to hospital given as the percentage of total admissions for all cases in 1943 and the last ten years.

	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
Amoebic Dysentery ...	3.00	2.83	2.49	2.48	2.76	3.18	2.88	2.84	2.14	2.09
Bacillary Dysentery ...	2.28	0.26	0.18	0.13	0.13	0.17	0.26	0.72	0.22	0.39
	5.28	3.09	2.67	2.61	2.89	3.35	3.14	3.56	2.36	2.48

ENTERIC FEVER.

The distribution in 1943 by Provinces was as follows :—

Province.	Cases.	Deaths.	Province.	Cases.	Deaths.
Blue Nile	18	1	Khartoum	35	2
Darfur	—	—	Kordofan	6	2
Equatoria	21	3	Northern	31	1
Kassala	12	1	Upper Nile	22	2

The incidence of this disease during the last ten years has been as follows :—

1934	188	1939	202
1935	246	1940	336
1936	135	1941	129
1937	165	1942	167
1938	213	1943	145

LEISHMANIASIS.

The incidence during the last ten years has been as follows :—

Year.	Cases.	Year.	Cases.
1934	289	1939	394
1935	171	1940	460
1936	214	1941	494
1937	336	1942	432
1938	296	1943	225

Kala-Azar.

209 cases were reported with 61 deaths. The distribution of this disease shows no change. It is endemic along the whole length of the frontier with Abyssinia and Eritrea. Much investigation has been carried out to work out a more effective treatment of this disease with new drugs.

Espundia.

No cases of Espundia were reported during the year.

Cutaneous Leishmanisais.

16 cases were reported, of which 14 were from Kordofan and 2 from Kassala.

DISTRIBUTION.

Province and District.	Male		Female		Age Groups in years.						
	Cases	Deaths	Cases	Deaths	0-1	1-5	5-15	15-25	25-35	35-45	45-65
Blue Nilez ...	64	20	11	—	—	2	17	32	12	5	7
Darfur ...	2	2	—	—	—	—	2	—	—	—	—
Equatoria.											
S. Yubu ...	—	—	—	—	—	—	—	—	—	—	—
Torit ...	3	—	—	—	—	—	—	—	—	—	—
Kapoeta ...	18	1	6	2	—	—	2	5	8	8	1
Kassala.											
Kassala ...	12	5	3	—	—	—	4	5	5	1	—
Port Sudan	3	—	—	—	—	—	—	—	2	1	—
Gedaref ...	54	21	14	5	1	3	10	25	16	9	4
Khartoum.											
Khartoum...	1	—	—	—	—	—	—	—	1	—	—
Kordofan ...	20	4	2	—	—	3	11	4	1	2	1
Northern ...	4	—	—	—	—	—	—	3	1	—	—
Upper Nile ...	4	2	—	—	—	—	1	—	3	—	—
Total	189	55	36	7	I	8	47	74	53	29	13

RACE.

The races affected were :

Sudanese	214	Egyptians	1
Syrians	1	Abyssinians	7
Yemeni	1	Somali	1

RESULTS OF TREATMENT.

	Apparently cured %	Died. %	Still under treatment %	Untreated or lost sight of %.
1938	35.6	18.3	18.7	27.4
1939	42.1	26.4	21.1	10.4
1940	58.7	18.0	12.2	11.1
1941	47.4	28.9	11.1	12.6
1942	47.0	30.0	12.0	11.0
1943	41.0	25.0	20.5	13.5

LEPROSY.

The following table shows the distribution of lepers in the Sudan :—

Province	Under treatment in camps or settlements.	Under observation and treatment as hospital or dispensary outpatients.	Total under treatment.	Under observation but not under treatment.	Total cases.
Darfur	38	—	38	—	38
Equatoria	903	457	1,360	2,099	3,459
Blue Nile	39	23	62	33	95
Kassala	37	—	37	6	43
Khartoum	—	—	—	—	—
Kordofan	97	—	97	65	162
Northern	1	—	1	51	52
Upper Nile	—	3	3	27	30
TOTAL	1,115	483	1,598	2,281	3,879

There is no sign of any appreciable change in the incidence of this disease in any part of the Sudan except that it may be declining slowly in the Zande Area.

The lepers in the Sudan are dealt with in three ways.

In the Northern Sudan where the incidence of leprosy is low, lepers are dealt with by a system of isolation at home under the surveillance of the public health staff.

This method which has obvious advantages to the lepers works satisfactorily in towns such as Omdurman, where the standard of living and of housing is relatively high.

In the Central Sudan, where the incidence is higher, small leper colonies have been established near hospitals and dispensaries supervised by the hospital staff. This method has not proved satisfactory as a whole owing to the difficulty of arranging adequate medical supervision in many remote areas and of controlling the lepers, who are apt to wander in and out of the settlements at will, as all treatment of leprosy in the Sudan is on a purely voluntary basis.

In the Southern Sudan, which is the only area where leprosy is of public health importance, large settlements have proved satisfactory. The settlement at Li Rangu has been particularly successful. A scheme for establishing small village settlements under the village authorities is being tried in certain areas. There are still gaps to be filled as regards the treatment of lepers in the Southern Sudan but it is felt that additional efforts made in combatting leprosy should, be concentrated on the preventive side.

Local health visitors ensuring that lepers live apart from children, and propaganda by peripatetic Medical Officers, would do much in reducing the incidence of this disease in many areas.

LI RANGU.

Dr. A. Royland-Hunt, Senior Medical Inspector, Li Rangu reports as follows

Details of the lepers living at Li Rangu are as follows :—

Living in Settlement (but not segregated) at the end of 1942	593
Admitted during 1943	10
Deaths during 1943	36
Absentees in December 1943	82
Remaining in December 1943	485

Living in Segregation Camp at end of 1942	177
Admitted during 1943	5
Re-admitted during 1943	1
Deserted during 1943	35
Died during 1943	14
Remained in December 1943	134

During the year 365 lepers were given injections of chaulmoogra oil.

In an attempt to make some assessment of the value of medicinal treatment a hundred cases were selected who had been admitted to the Settlement in the earliest days and who had been receiving regular injections of chaulmoogra or its derivatives. All these cases had been admitted between the year 1929 and 1934 and had been given some form of medicinal therapy fairly continuously over a period ranging from 9 to 15 years.

The results were as follows :—

Stationary	24
Improved	40
Worse	26
Died	10
	100 cases

Skin-snips and nasal smears were examined from all the 90 survivors and 46 of these were found to be still infectious.

All the lepers in the Segregation camp now receive a full hospital diet containing an ample ration of meat. Their huts are kept in an excellent state of repair. They are given light manual labour for which they are paid wages. Their wounds and ulcers receive immediate and regular dressings in their own dispensary in the centre of the camp. No fewer than 7,538 such dressings were done during the year. Yet in spite of all the trouble and money which is expended on their behalf a large percentage continue to desert every year.

Living in the camp with their highly infectious parents are quite a number of children who have not yet contracted the disease. In order to minimise contact between these children and their parents a good proportion of them were persuaded to go to school. The C.M.S. school in Yambio very kindly took in eight girls, and ten of the boys were persuaded to attend the Li Rangu school. Huts in close proximity to the school have been built for the latter. These children now only live with their parents during the holidays.

MALARIA.

14,932 cases were admitted to haspital with 117 deaths. The incidence was relatively low in the Northern Sudan as a whole owing to favourable climatic conditions

The following table shows the number of admission to hospitals and deaths.

Province	Admissions	Deaths
Darfur	503	3
Equatoria	2,684	7
Blue Nile	4,751	40
Kassala	1,773	24
Khartoum	1,093	3
Kordofan	2,140	28
Northern	1,357	7
Upper Nile	631	5
TOTAL	14,932	117

BLUE NILE PROVINCE.

The incidence of Malaria was heavy at the beginning of and at the end of the year particularly in the Northern Gezira, on the White Nile south of Dueim, and between Sennar and Singa. The rains although not heavier than usual continued until the first week of November.

KHARTOUM PROVINCE.

The incidence was low.

NORTHERN PROVINCE.

The incidence remained low throughout the Province. In the Halfa Faras area the mosquitoe control scheme has been most successful and no cases have been reported from that stretch of the river. Further south, however, it was prevalent towards the end of the year.

OTHER PROVINCES.

The incidence was above average in Kassala area, average in Kordofan and below average in Darfur.

GENERAL.

The following table shows the spleen rate of children examined in the intermediate and village schools during the last four years.

Province or District	Percentage Spleen Rate.			
	1940	1941	1942	1943
BLUE NILE PROVINCE				
Gezira Area	14.8	13.5	18.3	26.4
White Nile	17.7	20.0	36.0	25.0
Fung	35.8	41.4	41.9	27.0
DARFUR PROVINCE	36.4	38.4	35.9	32.1
EQUATORIA PROVINCE	23.6	34.4	43.2	18.9
KASSALA PROVINCE.				
Port Sudan	0.9	—	1.8	2.1
Kassala	47.2	18.4	20.5	Not Examined
Gedaref	No Record.			27.1
KHARTOUM PROVINCE	3.5	1.5	1.4	1.7
KORDOFAN PROVINCE	32.7	32.2	24.1	38.7
NORTHERN PROVINCE	10.0	7.0	7.0	5.5
UPPER NILE PROVINCE	20.8	21.2	18.8	12.0

RABIES.

The number of persons receiving treatment during the past ten years has been as follows :—

YEAR.	Number of persons receiving treatment.	Deaths despite treatment.	Total. deaths.
1934	198	6	8
1935	290	4	10
1936	373	1	8
1937	534	6	11
1938	557	1	8
1939	422	8	16
1940	352	1	3
1941	407	7	14
1942	396	1	11
1943	358	—	7

All those treated had been actually bitten.

The following data are available as regards the fatal cases :—

Locality	Biting animal	Site of bite	Severity of Bite.	No. of days after bite when treatment was begun	No of Injections given.	No. of days from bite to fatal termanation
KORDOFAN.						
Bara	Dog	Left leg	Moderate	—	—	365
Dilling	Dog	,, ,,	,,	—	—	120
KASSALA.						
Gebeit	Dog	Unknown	Wound	—	—	3
Kassala	Dog	Left hand	—	—	—	120
BLUE NILE						
Medani	Dog	Left leg	Wound	—	—	91
Abu Usher	Dog	⎰ not	,,	—	—	50
Abu Usher	Dog	⎱ reported	,,	—	—	120

ACUTE RHEUMATISM.

The incidence in the last six years has been as follows :—

YEAR	Cases	Deaths
1938	292	4
1939	303	4
1940	223	3
1941	356	1
1942	136	—
1943	190	3

The distribution of cases by Provinces for 1943 was as follows :—

PROVINCE.	Cases.	PROVINCE.	Cases
Blue Nile	18	Khartoum	28
Darfur	43	Kordofan	31
Equatoria	4	Northern	19
Kassala	42	Upper Nile	5

SCURVY.

299 cases were reported with 1 death.

SLEEPING SICKNESS.

81 cases were reported in Equatoria Province compared with 75 in 1942.

The incidence during the past ten years has been as follows :—

Year.	Yubu	Yambio.	Yei.	Kajo-Kaji.	Meridi	Imported
1934	20	2	4	6	—	—
1935	80	—	1	10	—	—
1936	142	—	—	8	—	—
1937	63	1	2	23	—	—
1938	106	—	—	4	—	—
1939	103	—	—	6	—	—
1940	80	—	—	—	—	1
1941	69	—	—	1	47	8
1942	48	—	—	2	25	—
1943	60	—	8	1	9	3

475,508 palpations were carried out during the year and 5,848 gland punctures were performed.

60 cases were reported with 5 deaths.

Medical Inspector, Source Yubu reports as follows :—

" The control of Sleeping Sickness, Tsetse fly, and the treatment of cases has been continued much on the same lines as last year. 60 cases were discovered this year against 46 in 1942. In the Yubu area, where fly catching operations have been in process for the last 6 years, 12 new Sleeping Sickness cases were found this year against 3 last year. Of these 11 were second stage cases. All the 1942 and the majority of this year's cases came from a localised area fed by two streams that were brought under fly control this year.

River Duma, the only tributary of Yubu system that lies outside the block scheme, accounted for 5 cases this year against one last year.

An isolated outbreak occurred in River Biki area traced to an endemic focus which was harboured by people for the collection of rubber.

The other two infested rivers Mungu and Ya produced less cases than last year from the same endemic areas.

Sleeping Sickness inspections and clearing of watering places were carried out satisfactorily during the year.

Absentees accounted for only 1.9 per cent. of the population.

Sleeping Sickness Inspections.

Inspections continue to be satisfactory where they are carried out by chiefs and Zande S.M.S. staff. In addition to the check visits made by doctors it has been considered essential that any one area should be thoroughly inspected by a doctor at least once a year.

Total palpations during the year	196,674
,, gland punctures	3,170
, Sleeping Sickness cases found	60
,, absentees	3,834 or 1.9% of the total population.

Protective Clearings.

These have been maintained satisfactorily. Certain clearings were abandoned in areas where the incidence of cases was decreased and the fly densities lowered

Treatment and Progress of Cases.

(a) First Stage Cases.

There were 16 first stage cases. All were treated as in-patients in Yubu hospital. It is gratifying to note that none of these cases passed into the second stage.

The review of treatment carried out last year brought to light that relapses were mainly due to the insufficient treatment given to first stage cases. This was adjusted and put into practice this year, and had obviously borne fruit.

(b) Second Stage Cases.

There were 44 second stage cases all treated as inpatients with antypol and tryparsamide on the same lines as last year. The period of observation is three years during which the patient must be passed free from signs and symptoms of the disease before he is given a free bill of health.

5 deaths occurred among the 62 Sleeping Sickness cases, 2 of them attributed to Sleeping Sickness and the rest to various other cases. 56 cases remain under observation.

PROGRESS OF OLD CASES.

	1938	1939	1940	1941	1942	1943	Total
1 Readmission	—	—	1	—	—	—	1
2 Treated with Tryparsamide 1943 ...	10	13	28	35	31	46	163
3 Treated with O. Sod.	—	—	—	—	—	—	—
4 Intolerence to Tryp.	—	—	—	—	—	1	1
5 Under treatment	1	2	2	2	2	8	17
6 Under observation	4	1	8	4	6	5	28
7 Deserted	—	—	—	1	—	—	1
8 Deaths	—	1	2	1	—	6	10
9 Discharged cured	—	—	3	—	—	—	3
	15	17	44	43	39	66	224

The system of fly catching between blocks was continued and is producing valuable results.

Tsetse Fly Control Scheme.

Staff.

3 Block System Overseas.
3 Terabais.
7 Group Leaders.
33 Section Leaders.
237 Fly-boys.

Yubu Scheme.

Flies caught during the last 6 years.

YEAR.	Male	Female	Gravid	Total
1938	15,150	13,406	4,694	33,250
1939	15,888	12,097	5,079	23,064
1940	35,074	43,947	15,201	79,021
1941	51,058	41,500	29,985	122,543
1942	34,434	25,604	16,888	76,926
1943	14,078	9,978	5,900	29,956

Mungu (Riaboro) Scheme.

Flies caught since the beginning of the Scheme in May, 1942.

YEAR.	Male.	Female.	Gravid.	Total.
1942	8,927	3,068	2,306	14,301
1943	1,254	773	557	2,584

Meridi District.

Incidence of the Disease.

Only nine cases were detected this year compared to the 25 cases of 1942 and 47 cases of 1941. Thus the incidence seems to be falling and the disease which once was considered to be taking an epidemic form is coming to an end.

This is undoubtedly the result of energetic control which is carried out in the form of regular inspections of the population and tsetse fly control. Two of these nine cases died before completion of treatment as result of other debilitating diseases from which they were already suffering. They were both 2nd stage cases and their general condition was poor to start with. All the remaining seven cases were detected while in the 1st stage of the disease and were cured. The source of infection of three of these cases was traced to R. Edi, four to R. Naam and two both Edi and Naam. In addition to these nine new cases 24 of the old cases received treatment in hospital for relapse this year.

Yei District.

For the first time since 1937 cases of sleeping sickness have been detected in Yei Area. This was July 1943 when the routine inspections revealed four primary cases in Chief Modi's area along the Yei—Aba road. A subsequent inspection in November, 1943 revealed other four primary cases in the same area. The fact that this area remained free from the disease for about seven years caused the vigilance over the anti sleeping sickness measures to relax with the result that the people slipped further into the bush in search for food and water and consequently got into closer contact with the fly, thus rendering themselves liable to infection. The other possibility for the reappearance of the disease is its importation from the neighbouring infected areas of the Belgian Congo.

All the cases responded to treatment with Bayer 205 and are now under observation.

The inhabitants of that area are being brought back to live along the road and an adequate water supply is being provided for them.

VENEREAL DISEASES.

The incidence of these diseases remains high and will probably increase as the result of war conditions. The whole question of treatment in rural areas has been under consideration.

TUBERCULOSIS.

1,122 cases were admitted to hospital of whom 593 were pulmonary and 529 were non-pulmonary.

19 of the pulmonary cases were foreigners and four were Sudanese who contracted the disease in Egypt.

NATIONALITY.		NATIONALITY	
European	3	American	1
Yemeni	3	Abyssinian	11
Indian	1		

The following table shows the admission for pulmonary and non-pulmonary tuberculosis in the last ten years :—

YEAR.	Pulmonary	Non-Pulmonary	Total
	Admissions	Admissions	Admissions
1934	557	437	994
1935	501	371	872
1936	519	349	868
1937	488	395	883
1938	623	404	1,027
1939	685	396	1,081
1940	579	457	1,036
1941	631	511	1,142
1942	671	521	1,192
1943	593	529	1,122

The following table shows the admissions of tuberculosis in the Northern and Southern Sudan for the last four years.

	1940		1941		1942		1943	
	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.
NORTHERN SUDAN : ...	480	410	505	452	568	445	516	483
SOUTHERN SUDAN. ...	99	47	126	59	103	60	77	46

AGE INCIDENCE.

The following table shows the incidence of cases and deaths by age from pulmonary tuberculosis.

	AGE GROUPS IN YEARS.														65 and over		Total	
	0-1		1-5		5-15		15-25		25-35		35-45		45-65					
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Northern Sudan	–	–	1	–	18	2	12	19	198	36	116	13	60	15	8	–	527	85
Southern Sudan	–	–	–	–	1	–	9	–	29	4	21	4	6	2	–	–	66	10

PULMONARY TUBERCULOSIS.

Comparative table showing the occupation of persons affected with Pulmonary Tuberculosis during the last three years :—

	Prisoners	Cultivators.	Nomads.	Soldiers, Sailors and Police.	Day Labourers.	Townsmen			Indigent and un-employed.	Women not employed	Children.	Unclassified	TOTAL.
						Artisans & Shop-Keepers.	Clerical.	Servants.					
1941 ...	—	182	10	32	92	28	16	11	80	141	40	—	631
1942 ...	—	239	—	21	61	32	5	17	34	123	8	131	671
1943	21	129	—	25	113	44	12	31	113	81	3	21	593

NON-PULMONARY TUBERCULOSIS.

Admissions for non-pulmonary tuberculosis were classified as follows :—

	Gland	Bone	Joint	Other	TOTAL
Northern Sudan	179	171	66	67	483
Southern Sudan	13	16	11	6	46

Age groups were as follows :—

	AGE GROUPS IN YEARS.							
	0-1	1-5	5-15	15-25	25-35	35-45	45-65	65 & over
Northern Sudan	3	11	39	103	180	90	40	17
Southern Sudan	—	3	8	8	12	8	6	1

TUMOURS.

788 cases were admitted, classified as follows :—

Malignant	Carcinoma	146	
	Sarcoma	39	
	Unclassified	112	 297
Benign			 491
			788

The following table shows the admissions for malignant and non-malignant growths for the last five years :—

YEAR.	Malignant	Non-Malignant	TOTAL
NORTHERN SUDAN.			
1939	219	411	630
1940	205	259	464
1941	221	264	485
1942	164	205	369
1943	291	457	748
SOUTHERN SUDAN.			
1939	17	82	99
1940	15	66	81
1941	34	61	95
1942	11	62	73
1943	6	34	40

UNDULANT FEVER.

55 cases with 6 deaths were reported. The incidence during the last 10 years has been as follows :—

Year.	Cases.	Year	Cases.
1934	51	1939	29
1935	28	1940	43
1936	58	1941	31
1937	33	1942	17
1938	28	1943	55

PUBLIC HEALTH AND HYGIENE.

GENERAL REMARKS.

The rains were adequate and well spaced and the food crop position was satisfactory. Money was plentiful and there was little unemployment.

The state of public health was satisfactory throughout the year but it was only by constant vigilance and drastic measures that it was possible to prevent the introduction of epidemic disease from neighbouring countries. Smallpox and typhus in particular were raging in Egypt as far as the Sudan Border during the year.

Cerebrospinal meningitis remained prevalent and more or less restricted to the western part of Equatoria Province.

Relapsing Fever was prevalent in the Gezira area of Blue Nile Province.

This disease has a low mortality at present in the Sudan as a whole and it is difficult to persuade the people to treat it seriously for this reason. The improvement of the anti-malarial and sanitary organisation throughout the country continued. A fairly complete network of public health officials and subordinate staff now cover the whole Sudan, and 400 dispensaries provide curative facilities for the rural population and act as medical intelligence agencies in all areas. Smaller dressing stations, and tribal dressers attached to the nomadic tribes in the north or chiefs in the south fill the remaining gaps. It is considered that the curative and preventive services are approaching the limit of what can be afforded and are adequate to safeguard the health of the people from epidemic disease and provide accessible treatment and advice as regards the control of endemic disease. In a tropical country particularly it is by the effort of the people themselves that the standard of health can be raised most rapidly and efforts are now being made to make the people realise that their health is their own responsibility. Rural, town and Province councils which have developed considerably in recent years are rapidly incalcating the principles of collective responsibility as regards public health.

A new development in the health services to further this end is the establishment of the rural health centre in selected districts. These centres which are being staffed by Medical Assistants who have been given a special course of training of preventive and curative medicine in its widest sense will co-ordinate all the curative and preventive medical services in a rural area including the midwifery service, child welfare, sanitation, and anti-malarial work and will pay special attention to health propaganda and health education. They will enlist the help of the people in maintaining their health and the Medical Assistant will be the adviser in health matters to the local committees and sheikhs. He will keep in continual touch with them. Health education both adult and in schools will be an important feature of the health centre and models, pictures, plans etc., will be provided by the Graphic Museum for this prupose.

In this way it is hoped to teach the people to take a keen interest in their own health and local health problems, to enlist their enthusiastic support, and to aim at a state of affairs when it is the people themselves who are the executive force in health matters with the health staff as their technical advisers.

STAFF.

The public health staff continued to work at full pressure. Military problems, aircraft quarantine, and the prevention of epidemics have continued to cause much additional work.

One Public Health Officer sat for the Diploma of the Royal Sanitary Institute and passed.

Courses for Sanitary Overseers were held during the year. Four qualified in Khartoum.

YELLOW FEVER CONTROL.

No cases of yellow fever were reported during the year. Immunisation and *aedes* control continued on the same lines as in previous years. The campaign against *aedes* now forms an important part of the public health activities. Province *aedes* control units are working systematically though their provinces checking the results of the local public health staff and their results are again checked by a central *aedes* control unit working under the orders of the Medical Entomologist.

CONTROL OF AIRCRAFT.

The work of inspection and disinsectisation continued to be heavy.

The following number of known inspections were made :—

Khartoum	625
Malakal	1,013
Juba	1,566

PROPAGANDA.

Posters and notices were distributed from the Graphic Museum. Lectures and broadcasts were delivered.

THE HEALTH AND SANITATION OF PROVINCES

KHARTOUM PROVINCE.

Area, 5,700 sq. miles—Population 296,242

GENERAL

The rains were heavy but on the whole well spaced. No outbreaks of epidemic diseases occurred in the Province and the state of health remained satisfactory. The incidence of malaria remained low.

1 case of smallpox was imported into Khartoum North from Egypt. Prompt precautions were taken and no further cases occurred. 190,533 persons were vaccinated in the Province during the years. 28 cases of cerebrospinal meningitis were reported compared with 44 last years. 551 cases of relapsing fever were reported mainly in the rural district. There were 156 cases of dysentery reported compared with 227 in 1942. There was a slight increase in the incidence of tuberculosis and diphtheria. Two positive sporadic cases of typhus were reported. Improvement in living conditions in the Three Towns is being carried out as fast as possible.

BIRTHS AND DEATHS.

Registered births in the Three Towns were 5,249, deaths, 2,010. An excess of births over deaths of 3,239.

The average death rate for the Three Towns was 11.1 per 1000.

COMMUNICABLE DISEASES.

MALARIA.

The incidence of this disease remained low. The rains were well spaced and pools had time to evaporate before mosquitoes could breed.

Types of malaria were chiefly :

M.T.	1,218
B.T.	92
TOTAL	1,310

ENTERIC FEVER.

The incidence was nearly as low as last year and shows a marked improvement on previous years. The insanitary state of many pit-latrines in Omdurman was a probable source of infection.

CHICKEN POX.

54 cases were notified compared with 381 in 1942.

RELAPSING FEVER.

551 cases were reported compared with 63 in 1942. 90 cases were from the Three Towns and 440 from the rural district. 21 cases were imported. The rural district cases were chiefly from the Jebel Aulia area where the infection had come from the Gezira as the inhabitants mix with their relatives over the border and contract infection from cultivators and cotton pickers there.

AMOEBIC DYSENTERY.

100 cases were reported in the Three Towns compared with 154 in 1942.

BACILLERY DYSENTERY.

56 cases were reported compared with 73 in 1942.

TUBERCULOSIS.

147 Pulmonary and 13 Non-Pulmonary cases were notified compared with 136 and 18 respectively in 1942. Approximately half of these cases were locally infected.

THE CENTRAL PRISON—KHARTOUM NORTH.

The health and sanitation of the prison remained very satisfactory. Rations were adequate and there was no evidence of food deficiency diseases.

SCHOOL MEDICAL INSPECTION.

11,977 school children were examined during the year. The health of the school children remained satisfactory. No school has been closed for epidemic reason. A few sporadic cases of diphtheria, chicken-pox and measles have been reported.

Vision defects were referred to the Ophthalmic Surgeon and dental conditions seen and treated by the school dental officer.

NORTHERN PROVINCE.

Area 236,200 sq. miles — Population. 616,251

The health of the Province remained satisfactory throughout the year. There have been no major epidemics although smallpox occurred in the Shendi, Dongola and Halfa areas. In June it appeared likely that typhus might be introduced into the Province as the disease had become epidemic in the villages in Egypt immediately north of the frontier, and also along the Egyptian Reach of the river south of Shellal, and drastic measures had to be taken. The rains were below average and the Nile flood was later than usual but the river eventually rose well above average.

The crops were good, and more grain was grown than last year. The general economic position of the people was good.

The civil medical work has been well maintained under difficulties owing to urgent military demands.

The incidence of malaria remained low throughout the Province. In the Wadi Halfa—Faras area the new mosquito control scheme has been most successful and no cases have been reported from this area.

The river fell normally and there was little difficulty in controlling breeding places of mosquitoes.

The incidence of trachoma remains high. Treatment for this and other eye diseases forms a major part of the work of the hospital outpatient departments and dispensaries. The Eishash native lodging area of Atbara has been considerably improved during the year by an extensive replanning scheme. 440 new mud houses and 150 straw dwellings have already been constructed. It is hoped to complete the scheme by the end of 1944.

3,000 people live in this area.

Anti-Mosquito Work.

The most important anti-mosquito work has been affected in the Halfa—Faras area. The Faras basin has been stocked with Gambusia fish and the area between

Khor Musa Pasha just north of the cataract and the Faras basin has been cleared of anopheles mosquitoes.

This control has been affected as follows :—

(a) Khor Musa Pasha has been stocked with Gambusia fish.

(b) The pools north of this khor are oiled or sprayed with paris green.

(c) In the Debeira pump scheme some of the main irrigation channels are stocked with Gambusia fish and other small channels are oiled.

(d) The canal draining the Faras basin is stocked with Gambusia fish and is the main breeding pool for the rest of the central area.

This control has resulted in a barrier south of Wadi Halfa which anopheles breeding in the cataracts further south cannot penetrate. A specialised staff is maintained at Wadi Halfa working under the Medical Entomologist.

AEDES SURVEY.

During the year 469,593 inspections for *aedes* mosquito were carried out and no infections were found. As far as is known *aedes* mosquito have never been found in this Province.

BLUE NILE (GEZIRA) PROVINCE.

Area 54,775 sq. miles—Population 1,336,244.

The health of the Province was affected by a heavy incidence of malaria at the beginning and at the end of year particularly in the northern Gezira, Dueim area and between Sennar and Singa. The incidence of relapsing fever continued to rise and is a cause of considerable concern although the mortality is low. 77,606 cases were reported during the year.

There were a few sporadic cases of cerebrospinal meningitis. The public health organisation continued to function effectively but was hard pressed at times owing to the shortage of staff due to the demands of the war. A more effective control of *Anopheles Gambiae* has been instituted this year at Kosti and Dueim, and plans have been worked out for the better control of swamps at Singa.

The irrigated area of the Gezira (800,000 acres) has always been a major problem as regards malaria and bilharziasis and every effort has been made during the sixteen years since the scheme started to keep these diseases under control. Big perennial irrigation schemes in Africa are always a menace to public health and the Gezira scheme with its vast area in a region where *Anopheles Gambiae* abound and with endemic areas of bilharzia close to its western border presented a very serious public health problem. By taking the most stringent precautions the widespread epidemics of malaria which used to occur periodically have been practically eliminated although endemic malaria is prevalent at certain seasons of the year. There is evidence of some increase in the incidence of urinary bilharzia and there is reason to believe that rectal bilharzia may be spreading in certain areas. This question is at present under investigation. Rectal bilharzia is difficult to deal with as mass examination of the population is resented and one negative examination is inconclusive. It is however a most serious disease from the point of view of public health and must be dealt with. It is likely that effective preventive measures will be partly irrigation problems connected with the control of water and storage of water in the canals combined with the provision of rural sanitation and rural water supplies. On the whole there is reason to be satisfied with the results of the efforts made over a period of 15 years to keep the Gezira free from preventable disease.

KASSALA PROVINCE.

Area 134,450 sq. miles—Population 468.183,

The public health of the Province on the whole was satisfactory throughout the year. Relapsing Fever was prevalent in the Kassala district. Undernourishment was present in the Beni Amer part of the Red Sea Hills in the autumn owing to failure of the rains. The sanitary condition of Gedaref has considerably improved and the town was spared the widespread infection with dysentery which occurred during the dry season of 1941. Preventive work progressed throughout the province as fast as the difficulties due to war and local prejudice would permit. An extensive scheme of clearance and drainage is being carried out at Kassala town as an anti-malarial measure.

PORT SUDAN

Climatic conditions were average with a fairly heavy rainfall towards the end of the year.

Work in the Port has decreased considerably and there has been a considerable reduction in the floating population.

Admissions to hospital have decreased by 25 per cent. There was a considerable reduction in the increase of dysentery attributable to some extent indirectly to the reduced activities of the port. The public health service continued to function satisfactorily. A Public Health Officer was posted at Port Sudan in November for the first time. The scarcity of houses which had been causing general overcrowding was eased by the reduced military and port activities and by new building. Progress was made in the scheme of replacing bucket by septic tanks for sewage disposal. Weekly house to house inspection by mosquito-men continued—a fixed day in the week being allotted to different districts. Flies as usual created a problem in the autumn when humid conditions facilitate their breeding.

RATS.

There has been a large decrease in the number of rats trapped which is difficult to explain as the number of rat-catchers, traps, and the methods employed remain unchanged.

The following are the figures for the last seven years :—

1937	1938	1939	1940	1941	1942	1943
8,499	12,215	16,578	17,224	16,281	16,654	5,567

KORDOFAN PROVINCE.

Area 146,930 sq. miles — Population 1,252,441.

The health of the Province was fair. Relapsing Fever of a mild type was epidemic in Western Kordofan, East Jebels, and Central Kordofan and an outbreak of smallpox occurred in Northern Kordofan. There were also small outbreaks of cerebrospinal meningitis. The incidence of malaria was average. Venereal diseases still remain one of the major health problems in this as in other provinces.

The Province had a prosperous year and the rains were satisfactory in most areas. In the Nuba area the amount of cotton grown was less than usual, its place being taken by grain, with the result that this area had a large exportable surplus.

During May and June water was again short in El Obeid but extensions carried out to the existing water storage arrangements should prevent a repetition of this shortage.

Sanitation throughout the Province was carried out satisfactorily within the limits of existing services.

A Government dairy was opened in El Obeid in July.

DARFUR PROVINCE.

Area 138,150 Sq. miles—Population 706,391.

The health of the Province remained satisfactory and the grain situation was better than in 1941. There was no serious malnutrition. The rains were good and an excellent harvest was expected in most areas. Locust invasion, however, did much damage in the northern part of the Province. Only two outbreaks of epidemic disease of any importance occurred, one of cerebrospinal meningitis and the other of relapsing fever. The incidence of malaria was considerably lower than in 1942. One case of malaria was imported from the U.S.A. This is probably the first recorded in the Sudan. No cases of smallpox were reported during the year but 117,000 vaccinations were performed. Great efforts were made to keep the aerodromes free from *aedes* infections and these were successful despite the great numbers of empty tins for which there was no covered storage accommodation. 424 gallons of insecticide were used in spraying houses and 1,296 gallons of anti-malarial oil for oiling pools etc. The health of the prisons remained satisfactory. Bilharziasis and trachoma were the most common diseases found amongst children and arrangements were made to treat them during school hours so that the treatment would not be avoided.

UPPER NILE PROVINCE.

Area 92,270 Sq. miles— Population 552,490.

The health of the Province was fair but a shortage of grain imposed considerable hardship and caused malnutrition in a few districts. It is considered that the health of officials in the Province is not up to previous standards, and it is suggested that the scarcity of fruit and vegetables in certain districts may be a contributory cause. No epidemics occurred during the year.

Subnutrition is probably common in this Province owing to seasonal desiccation lack of vegetables, shortage of meat, and a low standard of living. The incidence of malaria remains average. The anti-malarial organisation in Malakal has been reorganized and improved.

EQUATORIA PROVINCE.

Area 159,025 Sq. miles — Population 1,251,091.

The general health of the Province was well maintained but the rains were not on the whole up to average and there was shortage of food as a result in central and Torit districts. There was also a severe grain shortage in Aweil district, and along the Raja Road.

Cerebrospinal meningitis remained prevalent particularly in the western part of the province and 3,069 cases were reported during the year. Cases of relapsing fever were reported during the latter half of the year. Ankylostomiasis, bilharziasis mansoni, and guinea worm present major health problems and there is no evidence of any decrease in the incidence of these diseases. Work on the protection of water supplies in the guinea worm areas continues. Propaganda is carried out in schools against these diseases. The leprosy situation shows no appreciable change and there is no evidence to show that the incidence of this disease is on the increase. The incidence of sleeping sickness shows little change. 81 cases were reported during the year. The public health services continued to work satisfactorily, and the training of local subordinate staff proceeded as rapidly as possible. Sanitation in the district towns shows an improvement and the general standard is fair. Close attention was paid to the maintenance of mosquito wiring of officials' houses and special inspections and disinsectisation of premises were made wherever cases of malaria occurred.

The protection of the spring water supply of Wau has commenced during the year and the protection of one spring was completed in August with satisfactory results. A reduction in the number of military camps in the Province has considerably eased the work of the civil health staff on camp inspections. The standard of camp sanitation of the remaining camps in Juba showed an improvement over last year.

MATERNITY AND CHILD WELFARE.

22 midwives passed the qualifying examination and were licenced to practice in the Sudan. 417 midwives have been trained since the school opened of whom 325 are still in practice. 16 midwives attended Refresher Courses. The distribution of midwives by provinces is as follows :—

Khartoum	81	Kordofan	41
Blue Nile	66	Darfur	9
Northern	96	Upper Nile	6
Kassala	26		

MATERNAL MORTALITY.

It is only in the towns where the population is entirely served by trained midwives that it is possible to obtain reliable information regarding maternal mortality and the complications of child births.

The midwives of Omdurman attended 1937 cases, 22 being classed as abnormal. 81 cases were transferred to hospital. 96 cases abortion were treated by midwives of whom 35 were transferred to hospital.

The number of registered live births in Omdurman was 1,709.

The maternal mortality in Omdurman was 6.2 per 1,000 births, and 5 deaths in the Three Towns were due to puerperal sepsis.

The infantile mortality rate per 1,000 live births in Khartoum, Khartoum North and Omdurman was :—

Khartoum	86.3
Khartoum North	82.1
Omdurman	93.4

The following statistics are compiled from the records of cases treated in the hospitals of Khartoum, Khartoum North and Omdurman.

Total number of live births registered in the Three Towns was 5,249 (5,464).

Total cases attended in hospital was 606 (501).

(a) Normal	95 (83)	(d) Died	30 (32)
(b) Abnormal	511 (418)	(e) Live births in hospital	215 (1201)
(c) Recovered	576 (469)	(f) Still " " "	58

Complications and Causes of Death.

			Total.	Recovered.	Died.
Abortions	Septic	24 (17)	196 (144)	194 (144)	2 (0)
	Others	160 (127)			
Puerperal sepsis	Normal labour	40 (53)	84 (97)	80 (84)	4 (13)
	Abnormal labour	44 (44)			
Puerperal haemorrhage	Placenta praevia	9 (10)	63 (47)	61 (40)	2 (7)
	Other causes	54 (37)			
Puerperal albuminuria and convulsions		19 (18)	19 (18)	17 (16)	2 (2)
Other toxaemias of pregnancy			12 (16)	11 (14)	1 (2)
Phlegmasia alba dolens and embolism			2 (1)	– (1)	2 (0)
Other accidents and abnormal condition of the puerperal state			119 (93)	99 (85)	20 (8)
Illness complicating, but not directly due to pregnancy			128 (98)	123 (91)	5 (7)
			623 (514)	585 (475)	38 (39)

The figures in brackets are those recorded for 1942.

Maternal & Child Welfare Clinics.

40,849 ante-natal case attendances of whom 6,926 were new cases were reported in 17 centres in towns in the northern Sudan and one in the southern Sudan.

12,451 attendances with 4,954 new cases were reported from the clinics in Khartoum, Khartoum North and Omdurman.

1,890 attendances of whom 332 were new cases were reported from the child welfare clinic in Omdurman. There were 5,446 house visits and 2,507 children were vaccinated.

SCHOOL MEDICAL SERVICE.

48,065 pupils were examined in approximately 300 schools. In Khartoum Province 11,977 were examined compared with 13,250 in 1942. The school children are now examined every other year instead of yearly.

Regular inspection of school children and school buildings are made by the Province Medical Inspectors, Medical Officers and Medical Assistants carry out routine treatment. In Khartoum whole time Medical Inspector is employed on school work and inspection and care of teeth is carried out by a qualified Dental Surgeon.

The Assistant Ophthalmic Surgeon visits schools in Khartoum and advises on treatment for trachoma.

School dressers carry out the treatment ordered.

The health of the school children in the Sudan as a whole remains good and there is little change in the incidence of disease among them. Improvement continues to be made in the provision of better accommodation, increased latrine accommodation, and improved water supplies.

Health education and propaganda are carried out in schools.

The following table shows the results of the medical examinations :—

Province and District.	No. Exam.	% Tracho-ma	% Bilhar-zia	% Spleen	% Pulm. T.B.	% Ancy-lost.
Blue Nile Province :—						
GEZIRA AREA.						
Intermediate School	278	14.74	—	15.47	—	—
Elementary Boys ,, ...	1132	31.71	1.15	19.43	—	—
Elementary Girls ,, ...	110	41.82	62.73	41.82	—	—
Village Schools	6251	27.77	1.56	29.17	—	—
WHITE NILE AREA.						
Village Schools	813	31.98	10.7	47.6	—	—
1 Bakht el Ruda	356	19.1	19.24	8.98	—	—
Girls Elem. School	331	33.32	1.5	27.5	—	—
Intermediate ,, ...	53	16.98	20.74	15.74	—	—
FUNG AREA :						
Village schools	235	14.4	.43	27.02	—	—
DARFUR PROVINCE :						
Fasher District.						
4 Elem. Boys Schools	597	63.9	35.3	41.9	—	—
1 ,, Girls Schools	115	55.6	9.5	2.6	—	—
5 Khalwas	223	75.3	40.3	22.3	—	—
Nyala District.						
1 Elem. Boys school	169	53.8	35.5	47.7	—	—
1 ,, Girls ,, ...	47	68.1	14.8	31.9	—	—
1 ,, Boys ,, ...	107	20.5	11.2	26.1	—	—
Equatoria Province :						
R. C. Missions	89	42.69	—	82.02	—	—
WAU AREA.						
15 Elementary Schools	831	2.76	9.62	72.67	—	30.08
1 Intermediate	104	1.92	4.81	47.11	—	8.65
2 Central Schools	48	—	—	70.85	—	23.91
1 Trade School	33	—	6.66	63.3	—	15.15
LAKES DISTRICT.						
1 Central School	74	—	—	35.14	—	25.67
SOURCE YUBU DISTRICT.						
3 Elementary Schools	266	—	27.82	41.35	—	11.35
1 Central School	33	—	18.18	9.9	—	18.18
YAMBIO DISTRICT.						
4 Elementary Schools	198	—	18.18	42.93	21.21	33.33
YEI DISTRICT.						
1 Village School	89	26.96	21.35	26.96	—	17.97
3 Elementary Schools	239	35.14	12.97	30.54	—	27.61
MERIDI DISTRICT.						
1 Elementary School	70	1.46	45.71	14.29	—	21.43
TORIT DISTRICT.						
7 Elementary Schools	655	10.38	.46	17.7	—	4.12
1 Intermediate	69	5.78	2.89	8.68	—	10.15
Kassala Province.						
PORT SUDAN :						
1 Intermediate School	170	17.5	1.17	1.75	—	—
8 Elementary Schools	954	26.51	1.15	2.51	—	—
Kassala	—	—	—	—	—	—

Province and District.	No. Exam.	% Trachoma	% Bilharzia	% Spleen	% Pulm. T.B.	% Ancylost.
Kassala Province—(*Contd.*)						
GEDAREF AREA.						
Elementary Schools	183	54.42	—	31.69	—	—
Girls ,, ,, ...	90	34.44	—	16.66	—	—
Armenian Primary	18	16.66	—	5.5	—	—
Qala el Nahl Elem.	94	29.35	6.49	21.26	—	—
6 Villages Schools	212	22.16	—	39.1	—	—
Khartoum Province.						
Gordon College	268	25.0	—	1.1	—	—
Intermediate Schools	830	40.0	—	2.4	—	—
,, Girls ,, ...	488	25.0	—	0.8	—	—
Elementary Schools	6709	41.0	—	0.6	—	—
Village ,, ...	3682	48.0	—	3.7	—	—
Kordofan Province.						
CENTRAL DISTRICT						
1 Intermediate School	30	13.3	3.3	—	—	—
EASTERN KORDOFAN.						
2 Elementary Schools	274	13.0	12.0	36.4	—	—
2 Girls Schools	185	3.2	6.4	14.6	—	—
3 Villages Schools	204	11.2	3.9	22.5	—	—
NORTHERN KORDOFAN.						
2 Boys Elementary	285	12.2	1.0	17.5	—	—
1 Girls School	91	9.8	1.09	—	—	—
WESTERN KORDOFAN.						
5 Boys Elementary School ...	679	35.3	25.4	44.5	—	—
1 Girls School	122	30.3	.9	17.2	—	—
8 Village Schools	536	23.8	8.1	55.6	—	—
WESTERN JEBELS.						
4 Elementary Schools	463	3.0	35.2	48.3	—	—
4 Village Schools	107	7.4	31.7	51.4	—	—
EASTERN JEBELS.						
4 Elementary Schools	462	10.3	40.9	48	—	—
1 Girls School	69	.1	17.3	48.4	—	—
4 Village Schools	180	4.4	26.1	60.	—	—
Northern Province.						
WADI HALFA DISTRICT.						
31 Village Schools	1319	68.8	27.14	6.97	—	.37
8 Elementary ,, ...	1100	53.72	16.18	12.18	—	—
1 Intermediate ,, ...	152	51.95	15.78	5.92	—	—
4 Girls Schools	281	51.78	.36	4.2	—	—
MEROWE—DONGOLA DISTRICT.						
43 Village Schools	3882	39.13	12.8	5.82	—	.13
8 Elementary Schools	1199	27.6	3.5	4.92	—	—
3 Girls Schools	181	47.17	2.2	3.87	—	—
ATBARA DISTRICT.						
35 Village Schools	5653	37.52	10.2	7.32	—	.09
18 Elementary ,, ...	2405	31.44	8.39	10.18	—	—
2 Intermediate ,, ...	229	24.01	3.49	2.12	—	—
3 Girls Schools	189	36.36	—	—	—	—
SHENDI DISTRICT.						
3 Village Schools	202	29.7	—	1.98	—	—
1 Girls School	113	21.06	—	.88	—	—
Upper Nile Province.						
2 Mission Schools	139	3.9	—	1.7	—	—
Elementary—Malakal	121	4.13	2.47	22.31	—	—

QUARANTINE.

PORT SUDAN QUARANTINE.

The activities of the Port showed a decrease compared with the previous year. The Port of Suez was declared infected with typhus from June 24th until the end of the year and was considered infected with plague throughout the year. All Egyptian Ports were declared infected with smallpox from July 3rd until the end of the year.

No ships were quarantined during the year. The health of the Port remained satisfactory and no quarantine diseases were reported.

SUAKIN QUARANTINE.

The pilgrimage was above average but smaller than in the previous year. The number of Sudanese was the largest on record :

The comparative figures for the last six years are :—

	1938	1939	1940	1941	1942	1943
Sudanese	1851	1255	555	165	1419	2500
West African	6308	4268	2649	1920	7048	5170
TOTAL	8159	5523	3204	2085	8467	7670

All outgoing pilgrims were vaccinated against smallpox and inoculated against cholera, and kept under surveillance for yellow fever until six days had elapsed between leaving the yellow fever endemic area and their departure from Suakin. The pilgrimage was declared clean, and the period of quarantine was fixed at 24 hours but this had to be extended later as there were three cases of smallpox among the pilgrims. The general health of the returning pilgrims was fair but many suffered from chest troubles. Three cases of relapsing fever were found in returning pilgrims.

6,818 pilgrims departed from Suakin at the end of 1943 on the 1943—1944 pilgrimage.

WADI HALFA QUARANTINE.

1,117 Egyptian labourers passed through the quarantine. None were rejected. 85 were treated for Bilharziasis on entering at Wadi Halfa or at their destination. 17,530 persons arriving from Egypt were deloused as an anti-typhus precaution.

OPHTHALMIC REPORT.

By Mr. A. R. McKelvie.

The Eye Department at Khartoum contains 110 beds of which 66 beds are provided for male and the remainder 44 are for female patients.

The following figures summarise the work carried out during the past four years.

	Khartoum Eye Hospital	Omdurman Eye Hospital	Total
Inpatients.			
1940	582	112	694
1941	651	102	753
1942	882	—	882
1943	1.111	89	1,200
Outpatients.			
1940	52,918	31,416	84,334
1941	78,965	30,361	109,326
1942	82,531	—	82,531
1943	85,226	—	85,226
New Cases			
1940	10,341	11,158	21,499
1941	12,245	12,479	24,724
1942	14,033	—	14,033
1943	15,939	18,721	34,660
Operations.			
Major.			
1940	408	90	498
1941	565	112	677
1942	827	—	827
1943	897	—	897
Minor.			
1940	307	15	322
1941	580	30	610
1942	421	—	421
1943	471	—	471

REPORT ON THE STACK MEDICAL RESEARCH LABORATORIES FOR THE YEAR 1943.

BY DR. E. S. HORGAN.

RESEARCH.

In connection with the chemotherapy of Kala Azar investigations have been continued on conditions affecting the toxicity of solutions of 4.4 diamidino stilbene as well as a study of the excretion of this drug in patients undergoing treatment and the results will shortly be published.

Most of the other research activities during the year have been concerned with *ad hoc* problems and a summary will be found under the appropriate headings.

ROUTINE AND EDUCATIONAL ACTIVITIES.

A summary of routine work and examinations is appended to this report; the total number of examinations was 27,885 representing an increase of 7,689 over 1942. This has been largely due to the increase in the Kahn Tests, although owing to limited supplies of antigen it has still been necessary to limit numbers. As in 1942 a supply of the standarized antigen was made available through the kindness of the Director of Pathology, Middle East Forces (Colonel J. S. K. Boyd).

The adoption of Field's methylene blue stain (Report 1942) for thick blood films has continued to give excellent results in all hospital laboratories.

Staff Changes.

Three Sudanese Laboratory Assistants were trained during the year bringing the total to 36; in addition two were trained for the Sudan Defence Force. The number of hospital laboratories (26) remains unchanged.

Biochemical Tests.

There has been a steady increase in the number for the past four years—from 155 in 1940 to 250 in 1943. The principal tests carried out are Glucose Tolerance Tests, Blood Ureas and Urea Concentration Tests, Fractional Tests Meals and examination of Cerebrospinal fluids.

ROUTINE.

PATHOLOGICAL SPECIMENS.

The total was 429 (excluding brains for rabies).

POST MORTEMS.

15 were carried out in Khartoum Hospital, including seven medico-legal requested by the police.

NEOPLASMS.

189 were received of which 113 were malignant. The following table gives a brief summary :—

SITE.	Carcinoma	Sarcoma	Endothelioma	Melanoma	Mixed.	Total
Face	3	1	—	1	—	5
Lip...	—	—	1	—	—	1
Mouth	1	—	—	—	1	2
Parotid	2	—	—	—	4	6
Abdomen	2	1	1	—	—	4
Liver	2	—	—	—	—	2
Colon	1	—	—	—	—	1
Rectum	1	1	—	—	—	2
Anal canal	4	—	—	2	2	6
Breat	15	—	—	—	—	15
Uterus	2	—	—	—	—	2
Penis	1	—	—	—	—	1
Teatis	—	—	—	—	2 terato-mata)	2
Bladder	4	—	—	—	—	4
Lymphatic Glands ...	5	10	1	1	—	17
Bone-vertebrae	1	—	—	—	—	1
,, maxilla	1	4	—	—	—	5
,, clavicle	—	1	—	—	—	1
,, humerus	1	—	—	—	—	1
Eye	5	2	—	—	—	7
Ear	1	—	—	—	—	1
Nose	3	2	—	—	—	5
Larynx	1	—	—	—	—	1
Neck	2	2	—	—	—	4
Chest (Skin)	1	—	—	—	—	1
Arm	1	—	—	—	—	1
Thigh	—	2	—	—	—	2
Leg	4	3	1	—	—	8
Foot	1	2	2	—	—	5
TOTAL	65	31	6	4	7	113

Comments.

The melanomata included two from the anal canal—a rare situation among Sudanese.

Mouth.

The tumour arose from the palate and was a typical " Mixed Celled " salivary gland tumour. The palate is recorded by Ewing (Neoplastic Diseases. 3rd edition). as a very rare site.

Liver.

Both specimens were multiple carcinoma (sometimes entitled carcinomateous cirrhosis).

In one case a secondary focus in the humerus first brought the patient under medical attention. Later, the typical symptoms of cachexia with enlargement of the liver and ascites developed.

In the second case the liver was greatly enlarged and studded with numerous tumour nodules many of which were haemorrhagic and necrotic. There were large masses of tumour invading the lumen of the inferior vena cava and both lungs and pleurae were thickly studded with small nodules which superficially resembled lesions of tuberculsois.

Leg.

A rare tumour was a Rhabdomyoma of the adductor magnus muscle.

Regional Ileitis (Crohn's Disease).

An operation specimen of this rather rare condition and the first recorded in the Sudan was received from Mr. E. W. T. Morris, F.R.C.S., who also kindly provided the following notes.

Patient was a young man complaining of symptoms of subacute intestinal obstruction. At operation the last few inches of the ileum were found greatly thickened, rigid and constricted, while immediately above this it was much dilated. The thickening stopped abruptly at the ileo-caecal value. The mesenteric glands were enlarged and soft but otherwise nothing abnormal was found. The leucocyte counts, total and differential, were normal.

The affected portion of the ileum (about 7 inches) was resected and an end to side anastomosis made between the ileum and transverse colon. Patient made a good recovery and eight months after operation is perfectly well.

Pathologically the ileum was thickened, rigid and the lumen so narrowed that it was difficult even to pass down a fine probe. On opening, it had a very nodular appearance due to proliferation of the lymphoid tissues. Over one of Peyer's patches was a shallow ulcer.

Histologically there was marked hyperplasia of the lymphoid follicles with well marked germinal centres and many other areas resembling germinal centres, containing a few giant cells but showing no sign of necrosis and with a structure unlike that of tubercle. There were also numbers of polymorphs and plasma cells scattered through the lymphoid tissues. There was no tendency to infiltrate the muscle coat.

CHEMICAL DISINFESTATION OF RAILWAY COACHES.

In normal times the standard of cleanliness of the Sudan Railways and the high air temperatures to which the coaching stock is continually exposed have been sufficient to prevent infestation by bed bugs (*C. lectularius*). In war time however, factors such as the continual overcrowding of the passenger coaches, passage of troops etc., render the problem more difficult and it is scarcely surprising that occasional infestations have been reported especially in upholstered coaches.

Advice was sought by the Sudan Railways, Atbara as to the best methods of elimination of bed bugs and a preference was expressed for some non-toxic substance which could be easily applied at any of the railway depots and which would not need a specially trained staff.

Pyrethrum Powder.

This was the only non toxic substance available in quantity and several sets of experiments were carried out.

Small muslin bags were prepared and into each was put 6 or 8 freshly fed bed bugs. These bags were then placed in various situations in the compartments to imitate as closely as possible the natural conditions of infestation. *e.g.* behind upholstery, under mattresses, behind cane seatbacks (2nd class), in rolled-up blankets etc.

The compartments were then thoroughly dusted with pyrethrum powder blown through the special " duster " used by the Public Health Authorities and the compartments were sealed and left for 24 hours. The bags of bed bugs were then brought to the Stack Laboratories and examined. The results were quite conclusive ; with the exception of the bugs directly exposed to the pyrethrum and all of which were dead, the effect on the other batches was negligible, most of the bugs remaining alive and showing no evidence of poisoning. The results clearly indicated that pyrethrum powder would be useless for practical purposes.

Hydrocyanic Acid Gas.

This method of disinfestation is used as a routine on the steamers and barges of the Sudan Railways. It had not previously been tried on railway coaching stock in the Sudan owing to doubts that traces might remain in the compartments absorbed on upholstery and have a toxic effect on passengers.

However in December 1943 one coach (a combination of sleeping car and buffet car) was reported infested and it was decided to use HCN carrying out control tests with bugs as above. The disinfestation was carried out by the specially trained squad at Khartoum North Dockyard (under Mr. J. Thomson) and the concentration of HCN used was 0.72 per cent for 24 hours in the sealed coach. On opening up and removing the bags all the bed bugs were found dead. After 24 hours thorough ventilation the usual colour test papers were applied (Copper-acetate—benzidine-acetate reagent) and all papers remained colourless. This result, indicating complete absence of the gas was very satisfactory as the recent report on the Committee on Bed Bug Infestation (Medical Research Council—Report No. 245 London 1942 states that a concentration of 0.0009 per cent. or less gives a satisfactory margin of safety.

The rapid and complete elimination of HCN is undoubtedly greatly favoured by high air temperatures and low humidity and these factors are present in Khartoum throughout most of the year.

HCN disinfestation is therefore the method of choice for railway coaching stock, at least for the present as more recent insecticides such as heavy naphtha are unlikely to be available for some time to come.

KALA AZAR.

Work has been restricted this year to chemotherapy. Investigations on stilbamidine mentioned in last year's report were continued, their object being to elucidate the cause of the serious and somewhat anomalous late toxic effects which have been reported by various clinicians. This work has now been brought to a satisfactory conclusion, and the results have been published in detail (Kirk and Henry, Ann. Trop. Med. Parasitol. 1944 *in press*).

Briefly, it has been shown that these late toxic effects were probably not due to stilbamidine *per se*, but resulted because the solution with which the patients were injected contained also other substances which have been found to be much more toxic than stilbamidine. Aqueous solutions of stilbamidine are profoundly affected by exposure to light which produces chemical changes in the solution with greatly increased toxicity. The principal toxic compound thus produced has been isolated in pure crystalline state as the sulphate. Its exact chemical constitution is difficult to prove, but it is believed to be a dimer of stilbamidine, and is formed with great rapidity in solutions of stilbamidine which are exposed to the action of light. When tested in mice the biological results obtained with the isolated toxic product were in complete conformity with those of exposed solutions of stilbamidine.

The excretion and storage of stilbamidine after intravenous injection have also been studied, using the fluorescence test mentioned in last year's report. The results give some indication of the fate of stilbamidine in the body. It would appear that the kidney is the principal if not the only channel of excretion. The process of storage in the body is not progressively cumulative ; a stage of saturation is reached after which the drug is excreted almost quantitatively in an unaltered conditon. The drug does not appear to pass into the cerebrospinal fluid, thus explaining the failures in the late stage of sleeping sickness as reported by workers in other parts of Africa.

TYPHUS.

With the exception of one probable case of tick typhus in Equatoria Province (Report 1941) this disease has never been reported in the Sudan (see also Report 1937). During 1943, however, there was widespread epidemic typhus (louse borne) in Egypt extending to the Sudan frontier and it was therefore scarcely surprising that a small number of infections was imported in to Halfa.

Weil Felix Reaction—of 60 bloods sent from Halfa from clinically typical or suspicious cases, 14 showed positive agglutination titres of O X 19, ranging from 1 in 500 to 1 in 2500 while O X 2 and O X K were negative. Owing to the prompt control measures immediately introduced, any further spread south was checked but two anomalous sporadic cases of some interest subsequently occurred. Both were clinically typical but in neither could any connection with the Halfa cases be traced. The Khartoum case, a British official of British Overseas Airways Corporation, had not been away from Khartoum for two years. His blood gave a agglutination titre of O X 19, 1 in 500 and negative O X 2 and O X K.

The second patient was the wife of a British official in the Gezira and her blood gave a titre of O X K 1 in 2500, O X 19 and O X 2 both negative. Such a response is usually regarded as characteristic of mite typhus of the Far East but this type does not appear to have ever been reported in Africa.

Bat Survey—Bats are prevalent in the Gezira, and may give rise to nuisance in shops and dwelling houses, where they live under the roofs. They are heavily infested with mites which fall continually from the bat colony in the roof on to the people below, who complain of the irritation caused by the bites, and regard the bats as responsible for fever and other forms of illness. Rats having previously given completely negative results in a typhus survey (Report 1937) it was considered that the bats might be worth investigating in view of the O X K agglutination recorded above, and their association with mites which bite humans. 180 bats were therefore caught and their sera tested by the Weil Felix reaction. The results were entirely negative and therefore throw no light on the origin of the infection of the human case.

RABIES.

200 brains were examined of which 5 were decomposed and useless for section. 77 were positive for Negri bodies, including 67 dogs, 1 goat, 5 donkeys, 1 sheep, 1 monkey, 1 camel and one cat.

Rabies Vaccine—106,400 c.cs. were issued. This is the largest amount ever prepared in the Stack Laboratories, the previous highest figure being 62,075 in 1941. The increase was partly accounted for by the issue of considerable amounts to the Middle East Forces but local demands were also higher than usual.

Potency of fixed virus—In a recent series of extensive investigations, Webster has stressed the importance of a high potency of the fixed virus used for preparation of vaccines. He considered that vaccine should not be prepared from strains whose potency judged by mortality in mice (50 per cent. end point) is less than 1 in

10,000. It was therefore considered desirable to titrate the fixed virus (Paris strain) used in the Stack Laboratories for many years.

A series of dilutions of the virus ranging from 1/100 to 1/100,000 was inoculated intracerebrally into white mice, five mice being used for each dilution. The 50 per cent end points were calculated according to the method of Reed and Muench (Amer. J. Hyg. 1938—XXVII—493). Results were as follows :—

DILUTION.	Dead.	Alive.	TOTAL. Dead.	TOTAL. Alive.	Per cent. mortality
1/100	5	0	17	0	100
1/1000	5	0	12	0	100
1/10000	4	1	7	1	87.5
1/100000	3	2	3	3	50

A direct inspection of these figures shows that the 50 per cent. end point was 1/100,000 dilution which is a very satisfactory result.

Lymphgranuloma Venereum.

The occurrence of four clinically typical cases afforded an opportunity of laboratory investigation. The fresh pus from each case was inoculated intracerebrally into six white mice and subcutaneously into two guinea pigs.

In addition, the pus from one case was inoculated intracerebrally into a monkey (*C. aethips*).

All animals remained healthy with the exception of one guinea pig which developed a small inflammatory swelling in the groin at the site of inoculation. This was excised, minced up and inoculated into a further batch of 6 mice, 2 guinea pigs, and one monkey (the latter both intracerebrally and perirectally). None showed any evidence of any infection.

Similar negative results have been found in previous years and it would appear that the local strain of virus of this disease is of very low infectivity for the usual laboratory animals, for judging from the literature, other workers do not seem to have encountered such difficulties of isolation.

ACUTE INFECTIOUS HEPATITIS (EPIDEMIC JAUNDICE).

An outbreak of jaundice and fever on a considerable scale occurred during the summer in Kosti and more than 50 cases were admitted to hospital.

Clinically the cases were mostly mild and there were no deaths. As Kosti is on an important communication route from the Nuba Mountains it was thought desirable to exclude the possibility of yellow fever. Specimens of serum were taken from a number of these cases at the onset of the illness and again in convalescence and sent to the Yellow Fever Research Institute, Entebbe, for mouse protection tests. A few showed both tests positive indicating a previous exposure to yellow fever or inoculation by yellow fever vaccine but in the majority both specimens were negative. No case showed a change from negative to positive during the illness thus demonstrating beyond doubt that the epidemic was *not* yellow fever.

The few positive protection tests indicated, as on many previous occasions in the Sudan, the absence of any protective powers conferred by yellow fever against the virus responsible for these epidemics of jaundice.

BACILLARY DYSENTERY.

The value of rectal swabs (Report 1942) was strikingly demonstrated by a series of cases under the care of Dr. R. M. Humphreys in Khartoum Hospital. The rectal swabs were taken in every case on the same day as the specimen of faeces was passed and swabs and faeces were sent after a period of minimal delay to the Laboratories where they were immediately plated out. The results are briefly tabulated as follows :—

	Rectal Swabs		Direct stool plating.	
	Positive.	Negative.	Positive.	Negative.
Shiga	32	2	22	12
Flexner (group)	12	2	9	5
Sonne	2	0	1	1
Schmitz	2	0	1	1
TOTAL	48	4	33	19

Diagnosis.

During the year a trial was made of Hynes' medium and the results in general were more satisfactory than those obtained with Leifson's desoxycholate agar. The former medium however, requires five times the amount of the bile salt and as the stock available was very limited the medium could not be used as routine.

It cannot be claimed that the ideal selective medium has yet been found; that is, one which will selectively inhibit not only coliform organisms but also the numerous strain of *Proteus* and *Ps. pyosyanea* so ubiquitous in the Sudan.

A further problem arose in the preparation of pure sodium desoxycholate from bile as it was no longer possible to obtain any further supplies of this salt from England.

The method of preparation from ox bile was that described by Mair (Biochemical Journal 1917—XI—II); the isolation and recrystallisation was carried out by the Government Analyst. It was found that the amount of the salt isolated varied considerably in different batches of pooled ox bile although the initial volume was the same in each case. Thus the amounts isolated from 4 litres of bile ranged from 27 grms. to 13 grms. and in addition the quality of these batches varied widely, some batches giving a marked precipitation and dense capacity when incorporated in either Leifson's or Hynos' media which completely obscured the results.

In spite of a large number of experiments undertaken in co-operation with the Government Analyst and using different fractions isolated in the process of crystallisation, the cause of these anomalies is still obscure. Leifson had pointed out that certain substances such as fatty acids greatly lessened the inhibiting effect of his medium on the growth of *B. coli* and *Priteus.*

In confirmation of this it was found that the presence of fatty acids from the bile in quantities greater than 3 per cent. has a definite adverse effect on the selectivity of sodium desoxycholate. It has been found exceedingly difficult to remove these fatty acids and there is even no guarantee that material containing no visible fatty acid is in fact free from such acid. There is also a possibility that combination of desoxycholic acid and free fatty acids may occur and give a compound of very different properties from those of the free fatty acids. However even after repeated recrystallisations, certain specimens of desoxycholic acid still give unsatisfactory results and it is obvious that other factors than the presence of fatty acids are concerned. The work is being continued.

A series of recent tests indicates that better results are likely to be obtained from Leifson's citrate agar and that the sodium desoxycholate can be reduced from 0.5 per cent. to 0.2 per cent. thus effecting a considerable economy. This medium had not been previously employed owing to the statements of the author (Leifson 1935. J. Path. and Bact. XL.581) that certain dysentery types as Shiga and Sonne (commonly encountered in the Sudan) were inhibited by its use. It seems that this statement was based on the result of tests with stock cultures which are known to differ in certain respects from freshly isolated organisms.

Types of Dysentery Baccilli.

Although as usual, Flexner types were in the majority the increase in Shiga infections noted in last year's report was more than maintained ; these infections forming 38 per cent. of the total. None of Boyd's specific type was encountered during 1943.

VACCINIA.

Research. The extensive investigation initiated in 1942 in cooperation with the Senior Veterinary Research Officer, on the immunological relationships of sheep pox, goat pox, contagious pustular dermatitis, (sheep and goats) and vaccinia, were completed and are in course of publication (Bennett, Horgan and Mansour J. Comp. Path and Therapeut 1944 *in press.*)

ROUTINE—PREPARATION OF VACCINE LYMPH.

133 sheep were used : the total yield of pulp was 6,660 grms. the average being 50 grms. per sheep. These figures are very satisfactory, indicating both a potent seed lymph and a very uniform susceptibility of the native sheep.

A valuable observation has been made by Dr. Mansour Ali Haseeb that there is a considerable difference in "take" between sheep inoculated on the same day as shaved and those inoculated on the following day. In the former there is a marked exudate of serum which lessens the degree of "take" of the seed lymph and in consequence diminishes the amount of pulp when the animal is scraped on the 4th day.

This is avoided by inoculating the day after shaving.

Doses issued—1,396,500.

This figure represents a great increase over 1942 (447,650) and is accounted for, partly by wide spread vaccinations campaigns in the Northern Sudan during the year owing to the introduction of a number of cases of smallpox from Egypt and Arabia causing small local outbreaks and partly owing to large issues to the British forces in the Middle East.

Potency Tests.

Since, 1942, an unexpected snag has been encountered in the great variability of susceptibility to vaccinia virus of the stocks of rabbits. For some years the special inbred albino strain showed high and uniform susceptibility but duniug the past 18 months increasing numbers of rabbits exhibited a partial or complete natural immunity.

There has been no outbreak of rabbit pox or any other opizootic which might have produced cross immunity and it is therefore a reasonable, but as yet unproved, assumption that such resistance is caused by genetic variation in the stock.

Fortunately, experiments carried out some years ago on the susceptibility of various animals to vaccinia virus showed that the native sheep was a very suitable animal for the titration of potency. There is also a constant relation between the end points of vaccine lymphs titrated in parallel on sheep and rabbits, the latter being about ten times more susceptible. It was therefore possible to turn over from rabbits to sheep without any interruption in the testing and issuing of vaccine lymph.

SUMMARY OF ROUTINE EXAMINATIONS.

Kahn Tests	12,486
Widal Reactions	1,257
Weil-Felix Reactions	58
Blood Cultures	623
Blood Films	2,016
Blood Counts (Total)	65
Cerebrospinal Fluids	68
Biochemical Tests	250
Autogenous Vaccines	6
Pathological Histology (including brains for Rabies)	629
Faeces	2,576
Urines	1,053
Throat and Nose Swabs : *C. diphtheriae* positive	489
,, ,, ,, ,, ,, negative	5,554
Virulence Test (*C. diphtheriae*)	3
Sputa : *M. tuberculosis* positive	28
,, ,, negative	207
Spleen smears (Kala azar *ardinary*)	3
General Bacteriological Examinations	475
Water Examinations	39
Total Examinations	27,885

Summary of Faeces Examination.

B. dysenteriae Flexner V—Z types	105
,, ,, Sonne	22
B. Shigae	83
B. ambiguum (Schmitz)	9
B. typhosum	21
Entamoeba histolytics present	12
Ova Present	46
Negative	2,278

Summary of Urine Examination.

B. typhosum isolated	12
Negative	1,040
Ova (Bilharzia)	1

Summary of Blood Films for Parasites.

Malaria :—Benign Tertian	17
Subtertian	403
Quartan	1
Relapsing Fever	381
Negative	1,214

Summary of Widal Reactions.

B. typhosum	119
B. paratyphosum A	1
Br. melitensis	87
Negative	1,050

Summary of Blood Cultures.

B. typhosum	59
B. paratyphosum A	1
Br. melitensis	2
Strep. pyogenes	13
Other organisms	9
Negative	539

Summary of Weil Yelix Reactions

Positive	15
Negative	43

Vaccines Issued during 1943.

Cholera	5,000 c.cs.
Anti-Rabic	106,400 c.cs.
Staphlyococcus	375 c.cs.
T.A.B.	59,550 c.cs.
T.A.B: Endotoxoid	1,550 c.cs.
Vaccine Lymph	1,396.500 doses

REPORT ON MEDICAL ENTOMOLOGY

By Mr. D. J. Lewis.

LICE.

Tests were made on the effect under local conditions of the insecticide Lethane 384 Special, diluted with its own volume of cotton seed oil, for destroying head lice and their eggs on women's heads. It was expected that the custom of keeping the hair in plaits for several weeks at a time would render application difficult unless the hair was un-plaited. It appears however that if the insecticide is carefully rubbed into the hair near the skin un-plaiting is unnecessary and that the plaits may actually be advantageous in preventing the insecticide from passing from the skin to the outer hair.

An example of the infestation of eyelashes by *Phthirus pubis* was noticed near Wad Medani.

SANDFLIES.

Collecting has been continued.

MOSQUITOES.

A new subspecies of *Aedes lessoni,* was found at Wad Medani and some other places. It bites man.

The man biting form of *Culex,* which breeds in Omdurman and occurs at Khartoum, Shendi, Malakal, Wadi Halfa etc., and sometimes breeds on steamers, is considered to be *C. pipiens* ssp. *molestus* Forskal, a mainly southern European mosquito. In addition to the mosquitoes recorded by Edwards (1941, "Mosquitoes of the Ethiopian Region."—III) as occurring in the Sudan, 25 other forms are now known which bring the total to 121 species, 1 subspecies and 7 varieties.

MOSQUITOES IN RELATION TO MALARIA.

Work was continued at Wadi Halfa.

Apart from protecting the inhabitants against malaria control in this area has the object of minimizing the chances of *A. gambiae* reaching Egypt by steamer or aircraft and thus adding to the problem of control there or invading new areas to the north. The aim is to reduce the numbers in the Halfa area to a point approaching extermination. Control is in three forms, control of breeding, prevention of invasion, and prevention of spread northward. The prevention of invasion consists mainly of checking the annual northward spread of *A. gambiae* from the Second Cataract, where it passes the winter, to the area between the Wadi Halfa and the frontier. Southerly winds are infrequent and blow mainly by day. It was thought probable that the northward spread, usually against the wind, might be prevented by interposing a barrier area in which all breeding was prevented. This method has given very promising results and *A. gambiae* is now so scarce in the protected area that larvae has only been found four times in the last eight months.

Observations on *Gambusia* holbrooki were continued. It was found that fish born on 12th July began to reproduce after 41 days and that a second brood appeared after a further 19 days. The air temperatures during these periods were 28.3 and 27.2 C°. respectively. In the warmer weather of August and September breeding became more rapid and then became slower in the winter. The rate of breeding in the rains is of particular interest because in the northern Sudan most swamps can be stocked at this time.

Gambusia proved very successful in the Faras basin where, in the absence of predatory fish, the number rapidly increased from 100 to several millions. The results of stocking Rahad swamp and the Sennar Reservoir were encouraging, but stocking Danagla Forest gave poor results owing to a slow rate of increase.

At the Agricultural Research Institute a common problem was encountered, the continued appearance of adult *A. gambiae* in the apparent absence of fourth-stage larvae. This was attributed to sparse breeding in a large area of water in some 70 kilometres of channels, and to larval drift. Measures based on this assumption resulted in considerable improvement.

Experiments on larvicides showed that the floating type of Paris green used in this country floats far better and longer than several other types on the market.

At Kosti *A. rupipes* was commonly found in houses in January.

HOUSE FLIES.

Observation were made on the breeding of species of *Musca* in cow dung. When dung was heaped and left stationary few flies bred in the first few days. The dung remained cold however and breeding continued for many weeks. The effect of turning the dung was to produce great heat and increase breeding in the superficial layer. Even this breeding continued for several weeks and measures to prevent it, although successful, were laborious. Heaping was discontinued and the dung was sun-dried in the dry season and buried in the rains until it became unattractive to flies.

TSETSE FLIES.

A number of specimens of male terminalia were examined to find out the distribution of *Glossina morsitans* and its variety *submorsitans*. Generally speaking, specimens from the Nuba Mountains and the southern Sudan west of Yei consist of var. *submorsitans* and intermediate forms, whereas flies from places east of Yei and the southern Blue Nile Province are *G. morsitans*.

ROUTINE WORK.

Supervision of the work of the Headquarters Aedes Control Unit and Blue Nile Province Unit was continued.

Specimens for identification were received from many parts of the Sudan and from several other countries.

Several samples of sprays were tested on *Aedes aegypti*.

PUBLICATIONS.

The following papers dealing with Medical Entomology have recently been published.

Findlay, G.M., Kirk, R. and Lewis, D.J., (1941) Yellow Fever and the Anglo-Egyptian Sudan: the differential diagnosis of Yellow Fever— Ann. Trop. Med. Parasit., 35, 149-168.

Lewis, D.J. (1942), A northern record of *Anopheles gambiae* Giles (Dipt., Culicide). Proc. Roy. Ent. Soc. Lond. (B), 11, 141-142.

(1942), The early stages of *Aedes taylori* Edwards and A. furcifer Edwards (Dipt., Culicidae)— *ibid*, 153-154

(1942), A new species of *Aedes* (Dipt., Culicidae) from Eritrea.— *ibid.*, 165-166.

(1942), A method of transporting living mosquito-larvae.—Bull. Ent. Res., 33, 227-228.

(1942), The destruction of mosquito larvae by terrapins—Sudan Notes and Records, 25, 141.

(1943), Mosquitoes in relation to yellow fever in the Nuba Mountains, Anglo-Egyptian Sudan—Ann. Trop. Med. Parasit. 37, 65-76.

REPORT ON THE WORK OF WELLCOME CHEMICAL LABORATORIES

By Dr. A. J. Henry.

The work of the Laboratories has been maintained at high pressure throughout the year, and much work, particularly of a research or semi-research nature has been done. This has been in spite of some disorganisation resulting from the necessity of having to vacate the accommodation occupied in the School of Agriculture. Half of the Laboratories are now accommodated in a converted private house while the other half are still accommodated in out-house of the Agricultural Research Institute. However, the two halves are now only 100 yards apart, so we are slightly better off than previously.

The number of routine samples examined during the year was 703 as compared with 1,079 in 1942. Very few samples of milk and of methylated spirit have been submitted during the year, which accounts for a large part of the decrease in the number of samples examined, but makes little difference to the volume of the year's work. The samples received were classified as follows ; the corresponding figures for 1942 being also given :—

	1943	1942
Waters	81	122
Foodstuffs	157	224
Medico-legal and Miscellaneous Drugs	133	196
Mineralogical	112	129
Miscellaneous	220	408

WATERS.

Seventy five of those received was classed as potable waters, and included samples from El Obeid and Tokar. No samples were received from Port Sudan during the year.

FOODSTUFFS.

There was a large decrease in the number of samples of milk submitted for analysis. Miscellaneous foodstuffs included 43 samples of damaged sugar, 32 samples of flour and 28 samples of butters and cooking fats.

MEDICO-LEGAL AND MISCELLANEOUS DRUGS.

These are sub-divided into pathological (53), toxicological (20) and miscellaneous drugs (60). Forty two of the first group were associated with thirteen separate cases of suspected poisoning, but in only two there were definite positive findings, namely atropine and harbiturates. Seven samples of blood serum and four faeces were examined for serum calcium and chloride and for split and unsplit fat respectively. Amongst the samples classified as toxicological were four of hashish and one strychnine, but these were not associated with any of the above cases.

The miscellaneous drugs included native drugs for identification and pharmacopocial drugs for conformity to B.P. standards.

MINERALOGICAL.

Under this heading are included coals examined for the Railways, and various minerals and related materials.

MISCELLANEOUS.

Seventy eight of these samples were cotton seeds and cakes for oil content and grains for content of dirt ; 53 were rubber latices, 25 were soaps and 20 methylated spirits.

INVESTIGATIONS.

A large proportion of the year's activity has been connected with work of a research nature, and has included further work on the decomposition of stilbamidine, on the production of camphor from ocimum kilimandscharicum, the preparation of desoxy-cholic acid from ox bile and investigation of various new vegetables oils occurring in the Sudan.

Considerable progress has been made in the elucidation of the changes which stilbamidine can undergo under the action of light, but much remains to be done before our knowledge of the subject can be considered complete. The main features of progress to date have been submitted for publication in a letter to "Nature" and in a paper, in collaboration with Dr. R. Kirk, to the Annals of Tropical Medicine and Parasitology.

Work on the production of camphor from the leaves of ocimum kilimandscharicum has made excellent progress and we are now producing for local use material nearly white in colour and of sufficiently high quality for all ordinary medicinal purposes except perhaps internal application.

The investigation of vegetable oils occurring in the Sudan, which have not been hitherto described, has been carried a stage further during the year and the results have been submitted for publication. Three of the five oils described were drying oils, two of which were derived from the seeds of species of euphorbia and one from the seeds of ocimum kilimandscharicum. They are excellent substitutes for linseed oil in paints.

Resulting from the impossibility of obtaining fresh supplies of sodium desoxycholate for use by the Stack Laboratories in the preparation of selective growth media were asked to prepare material from ox bile locally produced. Following out exactly the method of preparation given by W. Muir (Biochem. Jl., XI, 1917, II) it was found that sometimes the product gave perfectly satisfactory results while at others it was useless owing to the almost complete absence of selectivity of growth of the organisms. At present we are unable to say, after completing a preparation, whether or not the product will be satisfactory, and there is obviously scope for much further work on the problem.

PROGRESS OF WORK.

CURATIVE MEDICINE.

The following figures show the number of inpatients, outpatients attendances and operations performed during the last twelve years:—

YEAR.	Inpatients.	Outpatient Attendances.	Operations Performed.
1932	59,642	4,264,412	7,287
1933	70,315	5,092,999	8,609
1934	85,990	6,039,197	10,082
1935	89,093	6,112,303	11,124
1936	96,081	6,500,441	11,229
1937	101,088	6,675,989	12,063
1938	104,366	6,989,990	11,438
1939	105,103	7,119,973	11,253
1940	104,422	6,649,335	11,139
1941	103,023	6,330,711	10,417
1942	114,837	6,750,329	11,353
1943	112,275	6,796,372	12,726

40 hospitals and 400 dispensaries with 6,700 beds offer curative facilities in all parts of the Sudan and it is unlikely that the curative services will be extended to any great extent during the next few years. Every effort is being made to improve these facilities by improving accommodation and considerable progress has been made in this respect during the year. Special attention is also being paid to the improvement of the standard of nursing and an establishment of British Sisters covering every Province in the Sudan has been approved. These Sisters will supervise the nursing in hospitals and the training of Province hospital staffs. Special attention is being paid to the training of Sudanese women as nurses as it is considered that a man is a poor substitute for a woman as regards nursing but it will be a long time before it will be possible to replace the majority of the male orderlies by women, and many of the former are most efficient. Prospects and training of male orderlies are also being improved. The establishment of British Sisters will have nearly doubled in ten years.

PREVENTIVE MEDICINES.

The training of subordinate public health staff has been carried on as fast as possible and the Sudan now possesses a large cadre of well-trained Public Health Officers and Sanitary Overseers who are proving of great value in dealing with the many public health problems the Sudan presents. It is significant that it was possible to prevent the spread of Typhus and Smallpox in the Sudan despite the constant risk of infection from outside the Sudan.

RESEARCH.

Research has been carried out during the year on Kala-azar, Typhus, Rabies, and calf lymph.

The Stack Laboratories continued to carry out much work for the Army.

MEDICAL WORK OUTSIDE THE SUDAN.

Dr. Ali Bedri, D.K.S.M., represented the Sudan Medical Service as an observer at the Arab Medical Congress in Cairo, and Dr. Mahmoud Hamad Nasr was in charge of a Sudan Medical Mission which accompanied the Sudanese pilgrims on the pilgrimage to Mecca and Medina.

TRAINING.

Courses were held for the training of the following categories of staff :

Hospitals.	*Public Health.*	*Laboratories.*
Medical Officers	Public Health Officers	Laboratory Assistants.
Dispensers	Sanitary overseers	
Asst. Radiographers	House to house Inspectors	
Medical Assistants	Mosquito men	
Hospital Orderlies	Midwives	
Female Nurses		

DISPENSERS.

Five students were under training during the year.

ASSISTANT RADIOGRAPHERS.

1 Student was under training during the year.

MEDICAL ASSISTANTS.

18 candidates attended a Course during the year.

PUBLIC HEALTH OFFICERS.

4 Public Health Officers were under training during the year.

SANITARY OVERSEERS.

5 Sanitary Overseers were under training during the year.

GRAPHIC MUSEUM.

This medical institution now plays important part in the teaching of preventive medicine in the Sudan. It has developed steadily and even during the war every effort has been made to complete it. It is now approaching completion as far as any museum of this sort can be completed.

It now comprises 1,627 photographs, 173 pictures, and 53 models in addition to plans, descriptions etc.

It is divided into the following sections :

1. Malaria.
2. Trypanosomiasis.
3. Leishmaniasis.
4. Syphilis.
5. Yaws.
6. Relapsing fever.
7. Filariasis.
8. Diphtheria.
9. Ancylostomiasis.
10. Schistosomiasis.
11. Madura disease.
12. Nutrition.
13. Tuberculosis.
14. Gonorrhoea.
15. Cholera.
16. Tetanus.
17. Anthrax.
18. Cerebrospinal Meningitis.
19. Plague.
20. Rabies.
21. Leprosy.
22. Measles.
23. Mumps.
24. Yellow fever.
25. Smallpox.
26. Chickenpox.
27. Vaccinia.
28. Dengue.
29. Typhus.
30. Quarantine.
31. Phlebotomous fever.
32. Disinfection.
33. Meteorology.
34. Water.
35. Influenza.
36. Pneumonia.
37. Dysentery.
38. Enteric fever.
39. Maternity and Childwelfare.
40. School Medical Service.
41. Disposal of waste matter.
42. Town planning.
43. Housing.
44. Undulant fever.
45. Blackwater fever.
46. Eye diseases.
47. Medical Entomology.
48. Skin diseases.
49. Folk medicine.
50. Venomous Snakes etc.
51. Historical medicine.

This museum is used for teaching medical, and health students, and for health education and propaganda.

KITCHENER SCHOOL OF MEDICINE.

By

By Dr. J. S. Aldridge.

GENERAL.

During 1943 there were 22 students in residence.

NUMBER OF MEDICAL STUDENTS.

School of Science.

January to May	6

School of Medicine.

Preclinical Class August to December	8
Junior Clinical Class	9
Senior Clinical Class	4
Special Clinical Class	1

PROGRESS OF CLASSES.

Examinations held :—

School of Science.

Biology, Chemistry and Physics.

School of Medicine.

Organic Chemistry.
Pharmacology with Pharmacy.
Pathology and Public Health.
Special Final Examination in Surgery.

SCHOOL OF SCIENCE EXAMINATIONS.

May Examination.

Biology, Chemistry and Physics.

Six students satisfied the examiners and were allowed to proceed to the Medical School. They joined two students who had been accepted following the January examinations.

SCHOOL OF MEDICAL EXAMINATION.

April Examination.

Special Final Examination in Surgery.

Abdel Razag El Mubarak satisfied the examiner and was granted the School Diploma by the General Board.

The examiner was Mr. F. Bartholomew, F.R.C.S.E.

September Examinations.

Pharmacology with Pharmacy.

Nine candidates were examined and all reached the required standard.

The examiner was Dr. R. Kirk, M.D., F.R.F.P.S.G., D.P.H.,

December Examinations :

Organic Chemistry.

Eight candidates were examined and seven reached the required standard.

The examiner was Dr. A. J. Henry, Ph.D.

Pathology and Public Health.

Four candidates were examined and three reached the required standard in both subjects.

The examination was carried out under the supervision of a " Visitor " appointed by the Royal Colleges of Physicians and Surgeons England, who this year was Brigadier D. Evan Bedford, R.A.M.C., M.D., F.R.C.P.

The examiners were :—

Pathology	... Dr. R. Kirk, M.D., F.R.S.P.S.G., D.P.H.
Public Health ...	... Dr. A. E. Lorenzen, D.P.H.

SCHOOL PRIZES.

The following prizes were awarded :—

September Examination.	
Pharmacology.	The Pharmacology Prize was awarded to Yousif Shibeika.
December Examinations.	
Pathology.	The Jackson Prize in Pathology was awarded to Girgis Ayad.
Public Health.	The Balfour Prize in Public Health was not awarded.

HOUSE APPOINTMENTS.

There are eight house appintments in Khartoum and Omdurman Hospitals and after passing their final examinations the graduates hold the posts of House Physicians, House Surgeon, House Surgeon Eyes and House Surgeon Obstetrics and Gynaecology alternatively over a period of two years.

POST GRADUATE COURSE.

No post graduate course was held during the year.

TEACHING STAFF.

There were no changes during the year.

LIBRARY.

Forty five new books were added to the library which now contains 1,500 volumes. During the year 400 books were lent to students and to civil and military practitioners.

STUDENTS' HOSTEL.

The hostel is part of the School and all the students are in residence.

HEALTH.

All students are examined medically at the beginning of the year. No serious illness was encountered during the year.

GAMES.

Facilities for tennis, football and netball are provided in the School grounds.

MISSIONS.

The following table shows the work carried out by Medical Missions :—

	Inpatients.	Outpatient Attendances	Operations.
THE CHURCH MISSIONARY SOCIETY.			
Omdurman (Khartoum Province)	1,750	67,141	366
Lui (Equatoria Province)	618	103,706	129
Salara (Nuba Mountains)	—	9,981	—
Katcha (Nuba Mountains)	608	17,364	100
Juaibor (Upper Nile Province)	—	3,592	61
Lei (Adok) (Upper Nile Province)	2	533	6
Paguir (Upper Nile Province)	—	488	—
THE SUDAN UNITED MISSION.			
Abri (Kordofan Province)	29	2,089	—
Rom (Upper Nile Province)	—	4,974	—
THE AMERICAN MISSION.			
Nasir (Upper Nile Province)	—	9,838	23
Doleib Hill (Upper Nile Province)	—	26,140	—

THE SUDAN INTERIOR MISSION.

Melut Abaiyat	} Figures not available from Mission

STAFF.

SUDAN MEDICAL SERVICE 1943

APPROVED BUDGETARY ESTABLISHMENT OF CLASSIFIED OFFICIALS.

Appointment.	Establishment
Headquarters.	
Director	1
Assistant Director (Public Health)	1
Assistant Director (Hospitals)	1
Controller of Medical Stores	1
Principal Matron	1
Head Staff Clerk	1
Staff Clerk	1
Clerks	22
Head Accountant	1
Accountant	1
Book-keepers	13
Chief Storekeeper	1
Storekeepers	9
Hospitals.	
Senior Physician	1
Senior Surgeon	1
Gynaecologist	1
Ophthalmologist	1
Senior Medical Inspectors	33
Assistant Ophthalmologist	1
Medical Inspectors	10
Surgical Registrar	1
Obstetrical Registrar	1
Medical Officers	65
Medical Assistants	309
Matron, Khartoum Civil Hospital	1
Matron, Nurses Training School	1
Charge Sisters	6
Nursing Sisters	16
Radiographer	1
Assistant Radiographers	7
Pharmacists	2
Dispensers	5
Dispensers under training	5
Book-keepers	58
Clerks	4
Southern Storekeepers	3
Head Hospital Orderlies	30
Theatre Attendants	22
Carried forward	639

Appointment	Establishment
Brought forward	639
Public Health.	
Medical Officer of Health	1
Assistant Medical Officer of Health	1
Chief Public Health Inspector	1
Senior Public Health Inspectors	10
Public Health Officers	20
Public Health Overseers	93
Principal, Midwives Training School	1
Charge Sister	1
Child Welfare Workers	2
Clerks	2
Staff Midwives	2
Staff Nurse	1
Research.	
Stack Medical Research Laboratories.	
Assistant Director (Research) and Senior Medical Research Officer	1
Bacteriologist	1
Assistant Bacteriologist	1
Laboratory Assistants (British)	4
Laboratory Assistants (Sudanese)	39
Head Laboratory Attendants	2
Clerks	3
Medical Entomology.	
Medical Entomologist	1
Technical Assistants	4
Clerk	1
Wellcome Chemical Laboratories.	
Government Analyst	1
Chemist	1
Technical Assistants	5
Junior Technical Assistants	2
Clerk	1
Kitchener School of Medicine.	
Registrar	1
Library Clerk	1
Graphic Museum.	
Assistant Curator	1
Museum Attendants	2
TOTAL	846

FINANCIAL.

The following figures show the actual Revenue and Expenditure of the Sudan Medical Service for the last three years :—

	1941	1942	1943
	£E.	£E.	£E.
1. **Revenue** .... — ...	79,180	80,951	72,569
2. **Expenditure :**			
Chapter 1. Personnel and Personal Allowances	167,329	182,682	213,946
Chapter 2. Services	129,108	136,887	146,066
Chapter 3. Extraordinary Expenditure	3,135	2,813	1,901
TOTAL	299,572	322,382	361,913

TABLE I.

ADMISSIONS AND DEATHS BY DISEASES.

	Blue Nile		Darfur		Equatoria		Kassala		Khartoum		Kordofan		Northern		Upper Nile		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1. T. B. Pulmonary	152	25	9	1	30	6	73	6	227	22	80	20	64	11	28	5	663	96
2. T. B. Non-Pulmonary	162	20	8	1	20	3	76	9	196	5	52	11	38	—	22	5	574	54
3. Syphilis	799	3	4,629	3	2,789	1	575	6	210	1	4,260	12	500	—	848	—	14,610	26
4. Gonorrhoea	551	2	475	—	814	—	625	1	168	—	1,182	—	269	—	196	—	4,280	3
5. Soft Sore	70	—	43	—	14	—	78	—	52	—	154	—	7	—	30	—	448	—
6. Trachoma	86	—	270	—	10	—	73	—	37	—	78	—	89	—	43	—	486	—
7. All other eye diseases	203	1	216	—	719	—	110	—	1,099	—	344	1	469	—	428	—	3,588	2
8. Ear	66	1	20	—	52	—	26	—	43	1	102	—	41	—	17	—	367	2
9. Skin	160	—	80	—	892	—	55	—	101	2	515	—	80	—	39	—	1,922	2
10. Wounds and other injuries ...	2,517	73	2,192	33	4,665	43	1,898	38	1,319	29	3,528	49	1,294	10	753	13	18,166	288
11. Tumours Malignant	53	5	7	2	6	—	13	2	80	13	44	5	23	2	2	—	228	29
12. Tumours Non-Malignant ...	58	1	3	—	35	—	43	—	158	7	69	4	21	1	8	—	395	13
13. Gynaecological	318	5	21	—	23	2	129	2	374	4	187	3	132	4	11	—	1,195	20
14. Confinements	140	10	45	—	28	3	71	5	488	11	91	5	62	3	3	—	928	37
15. Poisoning	25	—	—	—	11	—	9	1	13	3	10	—	9	—	—	—	77	4
16. Ancylostomiasis	30	—	1	—	1,968	19	8	—	5	—	8	—	40	—	77	—	2,137	19
17. Bilharziasis	180	8	26	1	358	2	66	—	63	—	154	—	82	3	59	—	988	14
18. Blackwater Fever	2	—	—	—	7	2	—	—	—	—	3	—	1	—	—	—	13	2
19. Dysentery, Amoebic	435	18	496	15	152	5	392	13	113	2	504	24	140	5	122	5	2,354	87
20. Dysentery, Bacillary	35	4	—	—	99	10	65	5	101	5	91	8	39	—	2	—	432	32
21. Filariasis	4	2	8	—	16	—	—	—	—	—	6	—	1	—	—	—	35	2
32. Madura disease	95	—	9	1	1	—	41	—	75	—	18	2	39	—	—	—	278	3
23. Malaria	4,751	40	503	3	1,993	7	1,773	24	1,093	3	2,140	28	1,357	7	631	5	14,241	117
24. Leishmaniasis	64	20	2	1	31	4	86	31	1	—	10	2	3	—	4	2	201	60
25. Trypanosomiasis	—	—	—	—	435	5	—	—	—	—	—	—	—	—	—	—	435	5
26. Yaws	—	—	1	—	1,341	1	—	—	—	—	—	—	—	—	14	1	1,356	2
27. Heat Stroke	—	—	—	—	—	—	12	—	—	—	—	—	—	—	—	—	12	—
28. Guinea Worm	30	—	35	—	280	1	8	—	2	—	85	—	1	—	20	—	461	1
29. Tropical Ulcer	668	8	160	—	3,239	6	123	5	167	—	829	1	10	—	212	3	5,408	23
30. Anthrax	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—
31. Cerebrospinal Meningitis ...	44	22	28	12	352	101	4	2	28	10	33	12	3	2	98	16	590	177
32. Chickenpox	118	—	6	—	143	—	109	—	70	—	126	1	38	—	63	—	673	1
33. Dengue	—	—	25	5	—	—	—	—	—	—	—	—	3	—	—	—	28	5
34. Diphtheria	45	4	—	—	1	1	47	6	128	17	18	6	13	1	1	—	253	35
35. Enteric Fever	18	1	—	—	21	3	13	1	37	2	6	2	31	1	22	2	148	12
36. Erysipelas	7	—	—	—	1	—	1	—	1	—	2	1	1	—	—	—	13	1
37. Gastro Enteritis of Children ...	11	1	—	—	206	2	23	4	239	24	23	5	8	1	8	—	518	37
38. Influenza	17	—	81	1	348	3	66	—	85	4	118	1	64	—	—	—	779	9
39. Leprosy	12	—	6	2	12	—	6	1	1	—	11	2	3	—	3	1	54	6
40. Undulant Fever	20	1	—	—	5	—	5	1	3	—	5	1	—	—	17	3	55	6
41. Measles	39	—	63	—	27	—	10	—	15	—	108	—	2	—	1	—	265	—
42. Mumps	51	—	22	—	38	—	48	—	62	—	228	—	37	—	—	—	486	—
43. Pellagra	—	—	—	—	—	—	2	—	—	—	14	—	—	—	—	—	16	—
44. Puerperal Fever	14	—	3	—	—	—	5	2	6	—	10	2	2	1	—	—	40	5
45. Phlebotomus Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
46. Pneumonia	806	110	130	20	328	31	338	28	699	33	306	23	229	10	78	10	2,914	265
47. Rabies	6	1	2	—	—	—	2	1	—	—	1	1	—	—	—	—	11	3
48. Relapsing Fever	732	40	4	—	84	4	455	32	176	5	60	3	5	—	9	—	1,525	84
49. Acute Rheumatism	18	—	43	1	4	—	42	—	28	—	31	2	19	—	5	—	190	3
50. Smallpox	—	—	1	—	—	—	1	—	1	1	10	2	—	—	—	—	13	3
51. Tetanus	12	10	—	—	3	10	3	3	8	3	4	2	—	—	1	1	31	29
52. Whooping Cough	13	—	—	—	16	—	—	—	15	1	39	4	6	—	—	—	89	5
53. Circulatory System	2,515	27	33	8	90	9	169	23	390	36	148	34	183	10	59	7	3 587	154
54. Respiratory System	615	4	137	—	1,567	16	433	6	490	4	1,055	69	493	10	151	5	4 941	124
55. Alimentary System	1,235	94	196	9	1,849	48	633	43	1,568	30	1,142	88	793	24	289	21	7,705	357
56. Genito-Urinary Sytem ...	422	22	76	7	121	4	232	8	333	17	428	28	282	11	22	—	1,916	97
57. Nervous System	80	7	20	1	39	4	42	3	115	13	98	9	33	1	9	1	436	39
58. Scurvy	4	—	—	—	12	—	21	—	6	1	2	—	—	—	6	—	51	1
59. Diabetes	26	—	1	—	1	—	14	—	72	1	17	4	18	—	1	—	150	5
60. Fever of uncertain origin ...	287	36	25	3	832	11	148	12	474	8	78	12	284	15	114	6	2,242	103
61. Typhus	—	—	—	—	—	—	—	—	—	—	—	—	8	3	—	—	8	3
62. All other diseases	663	19	151	6	1,457	21	602	8	1,277	4	1,053	38	287	10	781	15	6,271	121
TOTAL	19,482	655	10,112	136	27,585	388	9,903	332	12,512	322	19,718	527	7,656	146	5,307	127	112,275	2,633

TABLE II.

OUT-PATIENTS

NEW CASES BY DISEASES

and

TOTAL ATTENDANCES.

Disease	Blue Nile	Darfur	Equatoria	Kassala	Khartoum	Kordofan	Northern	Upper Nile	TOTAL
1. T. B. Pulmonary	141	14	74	121	233	100	203	28	914
2. T. B. Non-Pulmonary	59	4	20	149	206	100	11	3	552
3. Syphilis	13,069	13,786	6,177	5,296	3,988	19,964	2,938	7,263	72,481
4. Gonorrhoea	2,897	1,327	1,443	1,972	1,492	3,121	922	573	13,747
5. Soft Sore	822	251	305	1,248	246	588	27	19	3,506
6. Trachoma	37,103	4,846	758	14,764	4,273	6,859	32,241	302	101,151
7. All other Eye diseases	54,429	7,836	25,389	21,535	23,284	25,207	31,811	9,020	198,511
8. Ear	13,179	1,879	3,451	7,911	2,750	6,246	8,402	611	44,429
9. Skin	12,124	2,723	9,859	4,738	2,040	14,806	3,313	560	50,163
10. Wounds and other injuries	124,830	23,163	58,590	90,069	29,614	64,742	39,126	10,294	440,428
11. Tumours Malignant	38	3	10	32	106	77	—	—	266
12. Tumours Non-Malignant	3,360	3	29	215	172	215	87	43	4,124
13. Gynaecological	313	24	11	145	1,182	404	443	—	2,522
14. Confinements	54	17	12	16	206	134	28	—	467
15. Poisoning	35	5	6	1	1	39	11	—	98
16. Ancylostomiasis	35	3	5,849	53	11	36	87	48	6,122
17. Bilharziasis	2,253	909	4,500	235	304	4,485	1,960	122	14,768
18. Blackwater Fever	1	—	2	—	—	3	—	—	6
19. Dysentery, Amoebic	9,189	1,991	428	3,085	472	3,388	2,964	327	21,844
20. Dysentery, Bacillary	441	—	174	167	155	91	186	—	1,214
21. Filariasis	3	—	187	—	—	4	—	—	194
22. Madura disease	555	6	—	7	77	56	4	—	705
23. Malaria	77,606	4,637	8,624	11,026	2,440	29,963	14,540	4,715	153,551
24. Leishmaniasis	17	2	1	74	1	22	—	—	117
25. Trypancsomiasis	—	—	77	—	—	—	—	—	77
26. Yaws	—	27	16,022	70	—	—	—	12	16,131
27. Heat Stroke	—	10	1	7	—	—	—	—	18
28. Guinea Worm	71	91	1.612	5	2	377	1	73	2,232
29. Tropical Ulcer	1,932	623	16,480	1,819	270	4,061	1	1,234	26,420
30. Anthrax	12	—	32	—	—	1	—	—	45
31. Cerebrospinal Meningitis	127	26	659	2	22	51	9	—	896
32. Chickenpox	355	7	212	254	74	335	314	31	1,532
33. Dengue	—	—	—	—	—	—	—	—	—
34. Diphtheria	12	24	—	43	123	32	4	—	238
35. Enteric Fever....	3	—	—	7	41	6	15	—	72
36. Erysipelas	—	—	—	—	—	3	1	—	4
37. Gastro enteritis of children	906	12	311	545	907	617	269	431	3,998
38. Influenza	2,052	930	291	2,014	676	748	1,061	7	7,779
39. Leprosy	21	9	41	19	3	67	19	—	179
40. Undulant Fever	3	—	—	1	2	6	—	—	12
41. Measles	849	91	55	35	8	364	139	—	1,541
42. Mumps	273	20	59	153	126	539	444	2	1616
43. Pellagra	1	—	—	—	—	—	8	—	9
44. Puerperal Fever	12	—	—	1	6	16	15	—	50
45. Phlebotomus Fever	—	—	—	—	—	—	—	—	—
46. Pneumonia	2,530	116	426	229	729	511	743	94	5,378
47. Rabies	14	—	—	8	1	7	—	—	30
48. Relapsing Fever	5,349	3	84	94	224	902	4	—	6,660
49. Acute Rheumatism	513	464	470	1,161	34	73	2,938	32	5,685
50. Smallpox	—	1	1	2	2	55	26	—	87
51. Tetanus	3	—	14	1	6	4	1	—	29
52. Whooping Cough	1,104	28	22	260	88	151	592	—	2,245
53. Circulatory System	2,579	158	387	1,836	901	685	4,742	424	11,712
54. Respiratory System	71,957	8,614	32,568	28,619	17,414	30,108	25,274	5,535	220,089
55. Alimentary System	74,997	13,336	25,990	35,005	28,753	36,819	40,882	6,506	262,288
56. Genito-Urinary System	3,809	1,221	38	2,642	4,489	3,103	4,010	355	19,667
57. Nervous System	3,333	30	10	941	202	593	2,985	29	8,123
58. Scurvy	171	2	19	60	3	6	2	39	302
59. Diabetes	17	2	3	51	113	18	21	—	225
60. Fever of uncertain origin	24,456	640	8,634	7,033	15,417	5,876	11,456	2,383	75,895
61. All other diseases	84,862	9,529	51,163	18,017	16,814	15,494	59,144	6,664	261,687
Total New Cases	634,897	99,443	281,580	263,793	160,703	282,278	294,424	57,779	2,074,897
ATTENDANCES : MEN	701,613	139,853	439,043	397,078	437,733	407,207	320,704	95,050	2,938,881
WOMEN	371,877	69,380	212,903	101,831	183,259	250,234	242,731	46,758	1,478,973
CHILDREN	615,719	85,054	221,489	165,949	319,391	431,710	488,101	51,105	2,378,518
Total Attendances	1,689,209	294,287	873,435	664,858	940,383	1,089,151	1,051,536	193,513	6,796,372